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# Final Evaluation and Test Report for the Standard Waste Box (Docket 01-53-7A) Type A Packaging

Document Type: Technical Report      Division: DOE-HQ

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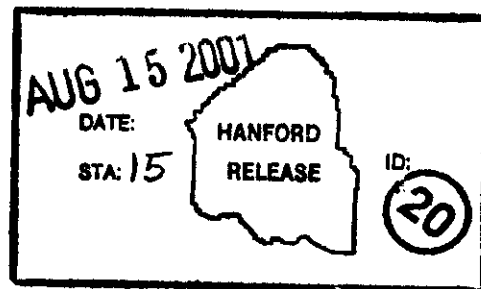
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**Abstract:** This report documents the U.S. Department of Transportation Specification 7A Type A (DOT-7A) compliance test and evaluation results of the Standard Waste Box (SWB). Testing and evaluation activities documented herein are on behalf of the U.S. Department of Energy-Headquarters (DOE-HQ), Office of Safety, Health and Security (EM-5), Germantown, Maryland. Duratek Federal Services, Inc., Northwest Operations (DFSNW) performed an evaluation of the changes as documented herein under Docket 01-53-7A.

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**LIST OF TERMS**

CFR	<i>Code of Federal Regulations</i>
CMTR	Certified Material Test Report
DFSNW	Duratek Federal Services, Inc., Northwest Operations
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
DOT-7A	DOT Specification 7A Type A Packaging
Mound	EG&G Mound Applied Technologies
MTR	Material Test Report
NPT	National Pipe Thread
NPTF	National Pipe Thread Fine
PTF	Pipe Thread Fine
PQCL	Packaging Qualification Checklist
SWB	Standard Waste Box
UNC	unified national course thread
WHC	Westinghouse Hanford Company
WIPP	Waste Isolation Pilot Plant
WMNW	Waste Management Federal Services, Inc., Northwest Operations

**FINAL EVALUATION AND TEST REPORT FOR THE  
STANDARD WASTE BOX (DOCKET 01-53-7A)  
TYPE A PACKAGING**

**1.0 INTRODUCTION**

This report documents the U.S. Department of Transportation (DOT) Specification 7A Type A (DOT-7A) compliance test and evaluation results of the Standard Waste Box (SWB). Testing and evaluation activities documented herein are on behalf of the U.S. Department of Energy-Headquarters, Office of Safety, Health and Security, Germantown, Maryland.

The SWB was originally tested and evaluated by Mound and EG&G Mound Applied Technologies (Mound) in 1988 and 1989. Westinghouse Hanford Company (WHC) evaluated and approved a design change that incorporated a lid lift nut under Docket 89-07-7A in 1989. These approved packaging configurations may be found in DOE/RL-96-57, Volume 1, *Test and Evaluation Document for DOT Specification 7A Type A Packaging*. The SWB design underwent evaluation in 1999 by Waste Management Federal Services, Inc., Northwest Operations (WMNW), under Docket 98-45-7A. Changes under Docket 98-45-7A were minor and consisted of incorporating several engineering changes that were made by the Waste Isolation Pilot Plant, in Carlsbad, New Mexico. Changes included more consistent identification of the materials of construction as used and applied in commercial practices. These approved packaging configurations may be found in DOE/RL-96-57, Volume 2, *Test and Evaluation Document for DOT Specification 7A Type A Packaging*.

The drawing and specification revisions approved for use as documented under Docket 98-45-7A are as follows:

- Westinghouse Waste Isolation Division Drawings:
  - 165-F-001-W1, Revisions F through K
  - 165-F-001-W2, Revision A
  - 165-F-001-W3, Revision A.
- Westinghouse Electric Company, Waste Isolation Division, Specification E-I-343, Revision 3, *Specification for the TRUPACT-II Standard Waste Box*.

The SWB design underwent further changes in 2001, and was evaluated by Duratek Federal Services Inc., Northwest Operations (DFSNW), under Docket 01-53-7A. Due to the reformatting of American Welding Society (AWS) D1.1: 2000, *Structural Welding Code—Steel*, references previously identified by subsections within the drawings and specification were deleted, and a more generic identification is provided. The approved packaging configurations evaluated under Docket 01-53-7A may be found in DOE/RL-96-57, Volume 2. Internal procedures developed, approved, and implemented per DFSNW-QAM-001, *Quality Assurance Manual*, were utilized in conducting this evaluation.



Evaluation of the approved SWB designs under Docket 01-53-7A includes the following:

- Westinghouse, TRU Solutions LLC, Waste Isolation Pilot Plant Drawings:
  - 165-F-001-W1, Revisions L and M
  - 165-F-001-W2, Revisions B and C
  - 165-F-001-W3, Revisions B and C.
- Westinghouse Electric Company, Waste Isolation Division, Specification E-I-343, Revision 4, *Specification for Fabrication of the Standard Waste Box*.

## 1.1 PURPOSE AND SCOPE

The design verification procedure, HNF-SD-TP-TI-006, *Documentation and Verification Required for Type A Packaging*, was used to ensure that the packaging would meet the design requirements of Title 49, *Code of Federal Regulations* (CFR), Part 173. The packaging designs evaluated by DFSNW in June 2001, under Docket 01-53-7A, qualify as a radioactive material transport packaging because they have been evaluated as meeting the requirements of 49 CFR, Sections 173.24, 173.24a, 173.24b, 173.410, 173.412, and 173.462.

## 1.2 TESTING AND EVALUATION HISTORY

Test and evaluation information conducted by Mound in 1988 and 1989 may be found in the following documentation:

- *DOT Spec 7A Evaluation Document for WIPP Standard Waste Steel Box (SWB)*, Don A. Edling, Mound, August 15, 1988 (Edling 1988).
- *DOT Spec 7A Evaluation Document for TRUPACT-II Standard Waste Box*, Don A. Edling, EG&G Mound Applied Technologies, April 19, 1989 (Edling 1989).

As provided in the above-noted documentation, the SWB underwent and passed the water spray, compression, penetration bar drop, and 1.2 m (4-ft) drop tests.

The evaluation conducted by WHC in 1989 under Docket 89-07-7A is documented in DOE/RL-96-57, Volume 1. This document incorporates the Mound documentation identified above. The evaluations conducted by WMNW in 1999 under Docket 98-45-7A, and by DFSNW in 2001 under Docket 01-53-7A, are documented in DOE/RL-96-57, Volume 2.

The evaluation conducted by DFSNW in 2001 under Docket 01-53-7A is documented herein. By evaluation, the materials of construction and design of the SWB were found to meet all DOT-7A Type A packaging requirements. Appendix A of this report contains a Packaging Qualification Checklist (PQCL) that was used to capture and reference the design history of the SWB. In addition, Table 1-1 provides an Evaluation Summary of the changes that underwent review and evaluation under Docket 01-53-7A.

Information provided in Appendices A, B, and Table 1-1 was used to ensure that the packaging would meet the design requirements of 49 CFR 173.24, 173.24a, 173.24b, 173.410, 173.412, and 173.462.

Table 1-1. Evaluation Summary for the Standard Waste Box, Docket 01-53-7A.		
Document	Change	Evaluation
WID/WIPP Drawing 165-F-001-W1, Rev. K, "TRUPACT-II Standard Waste Box Assembly" (06/24/99)		This is the latest drawing revision that the SWB was evaluated to under Docket 98-45-7A. Sheets W2 and W3 remain unchanged and are each identified as Rev. B.
WID/WIPP Drawing 165-F-001-W1, Rev. L, "TRUPACT-II Standard Waste Box Assembly" (01/02/01)	Engineering Change Order 9946 revised sheet 1, Notes 2, 3, and 4.  The references to the subsections within AWS D1.1 have been removed as identified below:	<b>Note: Prior to fabrication, the shipper shall ensure that the AWS D1.1 (2000) requirements have not changed from the time this evaluation has been performed, and that the integrity of the SWB design is not effected in a negative manner.</b>
	Rev. L, Note 2 reads: Welding personnel shall be qualified for fillet welds $\leq$ 1/4-in. as specified by AWS D1.1, "Details of Fillet Welds," "Qualification Tests for Fillet Welds Only and Plug Welds Only," or equivalent.	Rev. K, Note 2 stated: Welding personnel shall be qualified for fillet welds $\leq$ 1/4-in. as specified by AWS D1.1, Section 2.7, "Details of Fillet Welds," and Section 5.22, "Qualification Tests for Fillet Welds Only and Plug Welds Only" (or equivalent).  Specific subsection identifications within AWS D1.1 have been removed to avoid revision conflicts that may occur in the future. AWS D1.1 (2000) was reviewed, specifically Sections 2.4 and 4.25 regarding fillet welds; no changes from AWS D1.1 (1998) were found.  <b>This change has been evaluated as having no effect on the packaging design, and is acceptable.</b>
	Rev. L, Note 3 reads: All welds shall be visually examined in accordance with AWS D1.1, "Visual Inspection."	Rev. K, Note 3 stated: All welds shall be visually examined in accordance with AWS D1.1, Subsection 8.15.1, "Visual Inspection."  Specific subsection identifications within AWS D1.1 have been removed to avoid revision conflicts that may occur in the future. AWS D1.1 (2000) was reviewed, specifically Section 6.0--Inspection. Minor changes and improvements from AWS D1.1 (1998) were found, specifically in Table 6.1

Table 1-1. Evaluation Summary for the Standard Waste Box, Docket 01-53-7A.		
Document	Change	Evaluation
		<p>concerning visual acceptance criteria for undersized welds and the implementation of "Welding Procedure Specifications."</p> <p><b>This change has been evaluated as having no effect on the packaging design, and is acceptable.</b></p>
	Rev. L, Note 4 reads: Visual weld inspectors shall be qualified in accordance with AWS D1.1, "Inspector Qualification."	<p>Rev. K, Note 4 stated: Visual Weld inspectors shall be qualified in accordance with AWS D1.1, Subsection 6.1.3, "Inspector Qualification."</p> <p>The specific subsection identifications in AWS D1.1 have been removed to avoid revision conflicts that may occur in the future. AWS D1.1 (2000) was reviewed, specifically Section 6.0 and Subsection 6.1.4 regarding inspector qualification, and no changes from AWS D1.1 (1998) were found.</p> <p><b>This change has been evaluated as having no effect on the packaging design, and is acceptable.</b></p>
WIPP Drawing 165-F-001-W1, Rev. M; 165-F-001-W2, Rev. C; 165-F-001-W3, Rev. C "TRUPACT-II Standard Waste Box Assembly/Details" (04/16/01)	Engineering Change Order 10039 revised drawing sheets 1, 2, and 3 to show the SWBs are under the Packaging & Transportation System (PT03) rather than the Waste Handling System (WH02).	<b>This change has been evaluated as having no effect on the packaging design, and is acceptable.</b>
Specification E-I-343, Rev. 3, "Specification for the TRUPACT-II Standard Waste Box" (06/16/99)		This is the latest specification revision that the SWB was evaluated to under Docket 98-45-7A.
Specification E-I-343, Rev. 4, "Specification for Fabrication of the Standard Waste Box" (11/14/00)	<p>Engineering Change Order 9946 revised the specification format and deletes all references to "TRUPACT-II" and Subsections within "AWS D1.1."</p> <p>Changes are identified below:</p>	<b>Note: Prior to fabrication, the shipper shall ensure that the AWS D1.1 (2000) requirements have not changed from the time this evaluation has been performed, and that the integrity of the SWB design is not effected in a negative manner.</b>
	Title Page, Rev. 4 reads: "Specification for Fabrication of the Standard Waste Box."	<p>Title Page, Rev. 3 stated: "Specification for the TRUPACT-II Standard Waste Box."</p> <p>The text "TRUPACT-II" has been removed from the title for clarification purposes. The</p>

Table 1-1. Evaluation Summary for the Standard Waste Box, Docket 01-53-7A.		
Document	Change	Evaluation
		<p>SWB may be used either in the TRUPACT-II, HalfPACT, or as a standalone Type A packaging. The name change has no affect on the performance of the packaging.</p> <p><b>This change has been evaluated as having no effect on the packaging design, and is acceptable.</b></p>
	<p>Rev. 4, Section 1.1, Purpose. "The purpose of this specification is to convey fabrication instructions, testing, and acceptance criteria for the SWB."</p>	<p>Rev. 3, Section 1.1, Purpose. "The purpose of this specification is to address both the construction and use of the TRUPACT-II SWB."</p> <p>The "use instructions" are still contained in Section 4.0 , and no negative affect should result in the packaging design.</p> <p><b>This change has been evaluated as having no effect on the packaging design, and is acceptable.</b></p> <p><b>Note: It is suggested that upon the next revision of this specification that "use" be placed back into the title of this document since Section 4.0 clearly identifies "use" requirements. If it is intended to have a separate "user's" document, remove Section 4.0 from this specification when a separate document is implemented.</b></p>
	<p>Rev. 4, Section 1.2, Background. Identifies that the SWB can be used as a standalone DOT-7A Type A packaging.</p> <p>Footnotes have been deleted that provide reference to 49 CFR 178.350 for DOT-7A packaging, and DOE/RL-96-57.</p>	<p>The SWB has been tested and approved for use as a standalone DOT-7A Type A packaging. The deletion of the footnotes does not affect the SWB design in a negative manner as the references are already provided elsewhere within the specification.</p> <p><b>These changes have been evaluated as having no effect on the packaging design, and are acceptable.</b></p> <p><b>Note: It is suggested that upon the next revision of this specification that the following change be made:</b></p> <p><b>Section 1.2 identifies Dockets 89-07-7A and 98-45-7A within DOE/RL-96-57, Volumes 1 and 2, for qualification of the SWB. In addition, Docket 01-53-7A will also provide qualification of the SWB. Remove the references to the specific</b></p>

Table 1-1. Evaluation Summary for the Standard Waste Box, Docket 01-53-7A.		
Document	Change	Evaluation
		<b>docket identification. Each of the volumes within DOE/RL-96-57 will provide a cross-reference to the approved configurations for the SWB.</b>
	Rev. 4, Section 1.3, Definitions. Identifies CMTR as "Certified Material Test Report."	Rev. 3 of the specification did not include CMTR in definition section.  "Certified Material Test Report" is a term used within the specification and it is correct to identify the acronym.  <b>This change has been evaluated as having no effect on the packaging design, and is acceptable.</b>
	Rev. 4, Section 2.2, WIPP Shipment Compliance Documents. Deletes the identification of Subsection 2.2.2, DOE/WIPP-069, "Waste Acceptance Criteria for the Waste Isolation Pilot Plant."	Per the sponsor, the referenced Waste Acceptance Criteria document does not establish requirements for the use of the SWB. Package design and use are defined in the SWB drawings and specification. As the Waste Acceptance Criteria is a subtler document, it was removed as a reference.  <b>This change has been evaluated as having no effect on the packaging design, and is acceptable.</b>
	Rev. 4, Section 2.3, Construction Drawings (Current Revision). Identifies all three sheets of the box assembly and detail drawings.	Rev. 3 of the specification did not identify that three drawing sheets exist. The identification that additional drawing sheets exist provides better documentation for users.  <b>This change has been evaluated as having no effect on the packaging design, and is acceptable.</b>
	Rev. 4, Section 2.4, Codes, Specifications, and Standards. Adds a statement that, "The codes, specifications, and standards referred to by number or title in this specification or on the contract drawings shall form a part of this specification."	The addition of this statement does not affect the design of the packaging.  <b>This change has been evaluated as having no effect on the packaging design, and is acceptable.</b>
	Rev. 4, Section 3.0, Design Requirements and Performance Criteria. A complete reformat of this section was made, and some subsections renumbered. Changes are identified below:	Rev. 3, Section 3.0, Construction Requirements.  Refer to individual changes/evaluations provided below:

Table 1-1. Evaluation Summary for the Standard Waste Box, Docket 01-53-7A.		
Document	Change	Evaluation
	Rev. 4, Section 3.1, Description. Adds a paragraph that provides a brief description of the SWB. Includes the original text from the prior revision Section 3.0, but deletes the word "construction" from materials and processes utilized for fabrication of the box.	Rev. 3, Section 3.0, Construction Requirements. Identified the construction materials and processes utilized for fabrication of the SWB.  The specification now uses the term "fabrication" rather than "construction."  <b>This change has been evaluated as having no effect on the packaging design, and is acceptable.</b>
	Rev. 4, Section 3.2, Material Requirements. Includes the original text from the prior revision Section 3.1.  In addition, this section identifies that materials of construction are to be traceable by heat or lot number; Certified Material Test Reports are to be included in the data package; raw material receiving records are to be kept on file by the manufacturer; and that documentation shall be traceable to a finish-unit SWB serial number.	Rev. 3, Section 3.1, Materials. Identified that all materials of construction shall meet the requirements of the specification and as defined in the drawings. The requirements are stated in the specification as a whole.  <b>This change has been evaluated as having no effect on the packaging design, and is acceptable.</b>  <b>Note: The additional text incorporated in the "new" Section 3.2 would be better covered in the "new" Section 5.4, Documentation Requirements. Section 5.4 identifies that the manufacturer is to retain all records for the period of one year after delivery unless otherwise specified. In addition, Section 5.4 discusses what the data package is to consist of.</b>
	Rev. 4, Section 3.3, Fabrication Requirements. Deletes the original text from the prior revision Section 3.2; incorporates original text from the prior revision Section 3.3; and adds additional subsections.	Rev. 3, Section 3.2, Processes. Identified that all fabrication processes, tests, and inspections shall meet the requirements of the specification and as defined in the drawings.  Section 3.3, Qualification and Inspection Requirements. Identified the following subsections: Visual Inspection ( <i>for welds</i> ); Leak Testing; Paint Pre-Qualification and Inspection; Rivet Installation and Inspection; and Packaging Identification.  The identified changes more clearly define the qualification and inspection requirements and do not eliminate any previously established requirements. There is no negative affect on the packaging design.

Table 1-1. Evaluation Summary for the Standard Waste Box, Docket 01-53-7A.		
Document	Change	Evaluation
		<b>This change has been evaluated as having no effect on the packaging design, and is acceptable.</b>
	Rev. 4, Subsection 3.3.1, Assembly. This subsection has been added.	<p>The addition of this subsection provides clarity to the specification regarding assembly. There is no negative affect on the packaging design.</p> <p><b>This change has been evaluated as having no effect on the packaging design, and is acceptable.</b></p> <p><b>Note: The fourth paragraph regarding documentation and control of the manufacturing process is redundant and provided in Section 5.1, Quality Assurance Program, and Section 5.4, Documentation Requirements. It is suggested that this particular paragraph be deleted.</b></p>
	<p>Rev. 4, Subsection 3.3.2, Welding. Adds text that welding personnel are to be qualified per AWS D.1.1 or ASME Section IX. Welder qualification records and procedures are to be submitted to the Buyer in accordance with Attachment 1.</p> <p>Identifies inspection acceptance requirements of AWS D1.1, as in the previous revision (Subsection 3.3.1, Visual Inspection).</p> <p>Adds text that during welding care should be taken to ensure that deformation and distortions are held to a minimum but within drawing tolerances.</p>	<p>The welding requirements have been more clearly defined. ASME Section IX is commonly used as an acceptable equivalent to AWS D1.1 for welding processes associated with carbon steel.</p> <p><b>This change has been evaluated as having no effect on the packaging design, and is acceptable.</b></p> <p><b>Note: "Attachment 1" should be corrected to "Attachment A." Also, ASME Section IX is not listed in the reference or definition sections.</b></p>
	<p>Rev. 4, Subsection 3.3.3, Serialization. Previously Subsection 3.3.5, Packaging Identification. A unique 5-digit serial number is to be stamped per the drawings.</p> <p>Text has been added which states the data package records</p>	<p>Per discussion with the sponsor, the sponsor identified that serialization of containers is useless if it cannot be read, and that the drawing provides adequate control for this feature. Therefore, redundancy and ambiguity exists if this topic is addressed within the specification as well as the drawing. The serialization of the SWB does</p>

Table 1-1. Evaluation Summary for the Standard Waste Box, Docket 01-53-7A.		
Document	Change	Evaluation
	<p>shall reference each container by serial number.</p> <p>Text has been deleted which previously stated that the characters are to be of a sufficient size and depth to be easily read after painting.</p>	<p>not have a negative affect on the packaging design.</p> <p><b>This change has been evaluated as having no effect on the packaging design, and is acceptable.</b></p> <p>Note: It is suggested that text regarding serial numbers being legible after painting remain in the specification for contractual clarification purposes.</p>
	<p>Rev. 4, Subsection 3.3.4, Leak Testing. Previously Subsection 3.3.2, Leak Testing. Paragraph C no longer identifies the footnoted item (i.e., a commercially available leak test solution, or Buyer approved equivalent).</p> <p>The reference to "Section 5" in AWS D1.1 has been deleted in paragraph D.</p>	<p>The statement "to utilize a leak detection solution" is adequate since there are no specific performance requirements for the solution. It is stated that the weld will be repaired in accordance with AWS D1.1, the reference to "Section 5" was removed due to possible reformatting of the Standard in the future.</p> <p><b>These changes have been evaluated as having no effect on the packaging design, and are acceptable.</b></p>
	<p>Rev. 4, Subsection 3.3.5, Paint Pre-Qualification and Inspection. This was previously Subsection 3.3.3.</p> <p>Paragraph A(2) has been revised to state that only the "Buyer" ensures the proposed paint system is compatible with the contents to be shipped.</p>	<p>In Rev. 3, this paragraph stated that the "Buyer and/or User" shall ensure the proposed paint system is compatible with the contents to be shipped.</p> <p>The Buyer is the best individual to coordinate with the user and the fabricator to ensure that the approved paint system does not affect the ability of the packaging to meet DOT requirements. Per Section 4.0, "Use Requirements," the user is required to comply with the applicable sections of the DOT requirements.</p> <p><b>This change has been evaluated as having no effect on the packaging design, and is acceptable.</b></p>
	<p>Rev. 4, Subsection 3.3.5, Paragraph B(1) has been revised to specifically identify the dry film thickness on the box interior (1.5 mils) and exterior (3 mils), and no longer refers the fabricator to the drawing for reference information.</p>	<p>The mil thickness of the paint (internally and externally) is already identified on the drawing as Note 12. In addition, drawing Note 12 states that the paint thickness excludes the threads on the pipe coupling.</p> <p>This section of the specification does not conflict with the drawing and provides details for paint qualification and inspection</p>



Table 1-1. Evaluation Summary for the Standard Waste Box, Docket 01-53-7A.		
Document	Change	Evaluation
		not found on the drawing. The drawing requirements, as well as the specification requirements, shall both be met.  <b>This change has been evaluated as having no effect on the packaging design, and is acceptable.</b>
	Rev. 4, Subsection 3.3.6, Rivet Installation and Inspection. Previously Subsection 3.3.4. There are no text changes, only a reformat of the specification.	<b>This change has been evaluated as having no effect on the packaging design, and is acceptable.</b>
	Rev. 4, Section 4.0, Use Requirements. Due to formatting of the specification, a correction was made to Subsection 4.1.3 for compliance requirements as identified within the specification.  Due to formatting of the specification, a correction was made to Subsection 4.2.1 for a reference identified within the specification.  Due to formatting of the specification, a correction was made to Subsection 4.4.3 for compliance requirements as identified within the specification.	<b>These changes have been evaluated as having no effect on the packaging design, and are acceptable.</b>  <b>Note: Since the title of this document has been changed and now focuses on “fabrication” of the SWB, it is suggested that the next revision of the specification delete Section 4.0, and separate operational procedures for use be developed.</b>
	Rev. 4, Section 5.0, Quality Assurance Requirements; and Section 5.1, Quality Assurance Program. Changes have been made to each section title as identified.  Paragraph C(2) has been deleted. This paragraph identified that welding and weld inspection are a special process and are to be performed according to the SWB drawings.	Rev. 3, Section 5.0, Quality Assurance Program Requirements.  Rev. 3, Section 5.1, Quality Assurance Program for Construction. In addition, Section 5.1 identifies that this section pertains to the construction of the packaging (49 CFR 173.474) that is passed on to the fabricator.  Paragraph C(2), relating to welding and weld inspection was removed because of redundancy. Welding is considered a “manufacturing process” that is controlled as described in Paragraph C(1), and Subsection 3.3.2.

Table 1-1. Evaluation Summary for the Standard Waste Box, Docket 01-53-7A.		
Document	Change	Evaluation
		<p>This change has been evaluated as having no effect on the packaging design, and is acceptable.</p> <p>Note: Clarification and corrections are suggested in Section 5.1, Paragraph B, Subparagraphs (2) and (3).</p> <p>(2) Obtain Certified Material Test Reports (MTRs) for all structural and fastener components (correct "MTR" to read "CMTR").</p> <p>(3) Obtain Certificates of Compliance for all components, excluding the caulk and paint, which are commercial products.</p> <p>Although the sponsor has stated that there have been no notable degradation of materials that could have a limited shelf life (such as the gasket material), good business practice suggests that the cure date, shelf life, and/or percentage of remaining shelf life for gaskets should be requested from the supplier/fabricator as this component makes up a part of the containment system.</p>
	Rev. 3, Subsection 5.1.2, Documentation Requirements, has been deleted. These requirements are now found and expanded in Section 5.4.	For evaluation, refer to change and evaluation information identified in Section 5.4 discussion below.
	Rev. 3, Section 5.2, Quality Assurance Program for Use, has been deleted.	<p>The requirements provided in Section 5.2 (Rev. 3) are now contained in Section 4.0, Use Requirements, and specifically found in Subsections 4.1.1 through 4.1.3.</p> <p>This change has been evaluated as having no effect on the packaging design, and is acceptable.</p>
	Rev. 4, Section 5.2, Inspection Requirements, has been added.	<p>Inspection requirements for the SWB have been provided and clarified.</p> <p>This change has been evaluated as having no effect on the packaging design, and is acceptable.</p>
	Rev. 4, Section 5.3, Personnel Qualification, has been added.	The minimum requirements for non-destructive examination personnel are stated. In addition, personnel certifications

Table 1-1. Evaluation Summary for the Standard Waste Box, Docket 01-53-7A.		
Document	Change	Evaluation
		<p>from ASME Section IX as an alternate to AWS D1.1 is recognized.</p> <p><b>This change has been evaluated as having no effect on the packaging design, and is acceptable.</b></p>
	Rev. 4, Section 5.4, Documentation Requirements. Previously discussed in Subsection 5.1.2 and expanded.	<p>Expansion of documentation requirements within this section provides clarification to requirements within the specification.</p> <p><b>This change has been evaluated as having no effect on the packaging design, and is acceptable.</b></p> <p><b>Note: The first paragraph within Section 5.4 states that the data package shall include a list of the Measuring and Test Equipment used. Appendix A identifies that this list is to include calibration due dates. It is suggested that paragraph #1 and Item #16 in Appendix A be identical.</b></p> <p><b>The second paragraph states that the Certificate of Compliance shall be traceable to the serial number of the component(s). It is assumed that the "components" are the SWBs.</b></p>
	Rev. 4, Section 6.0, Submittals, has been added.	<p>This section was added as a part of the specification guidelines. By doing so, the specification becomes more standardized with Waste Isolation Pilot Plant (WIPP) requirements.</p> <p><b>This change has been evaluated as having no effect on the packaging design, and is acceptable.</b></p>
	Rev. 4, Attachment A – Document Submittal Requirements. This attachment identifies the document requirements, the applicable paragraph within the specification where the requirement may be found, and the applicable "coding" for approval or for record purposes.	<p>Paragraph references have been updated to include "inspection/test reports" and "measuring &amp; test equipment list with calibration due dates." Changed "C" (construction) to "F" (fabrication), which more accurately describes the SWB process.</p> <p><b>This change has been evaluated as having no effect on the packaging design, and is acceptable.</b></p>

### 1.3 SUMMARY

The approved SWB design evaluated under Docket 01-53-7A is described in Section 2.0, Appendix A, and Appendix B of this report, and is designed for and intended to ship Type A solid, radioactive materials, normal form, material form numbers 1, 2, 3, 4, and 5. For definition of material form numbers, refer to Section 2.3 of this report and to DOE/RL-96-57, Volume 2.

All DOT-7A Type A requirements of 49 CFR are addressed in this report whether the requirement is applicable to the evaluated package configurations. Based on the materials of construction and design, it was determined that no additional testing would be required because the Type A tests were previously performed by Mound. Testing under Mound included the water spray, penetration bar drop (1.0 m [3.3 ft]), stack, and 1.2 m (4-ft) drop test.

Documentation is provided by this report to satisfy the requirements of 49 CFR 173.415(a), "Authorized Type A packages," which states:

*"DOT Specification 7A (§178.350 of this subchapter) Type A general packaging. Each offeror of a Specification 7A package must maintain on file for at least one year after the latest shipment, and shall provide to DOT on request, complete documentation of tests and an engineering evaluation or comparative data showing that the construction methods, packaging design, and materials of construction comply with that specification. Use of Specification 7A packagings designed in accordance with the requirements of §178.350 of this subchapter in effect on June 30, 1983 (see 49 CFR Part 178 revised as of October 1, 1982), is not authorized after April 1, 1997."*

This document will serve to meet the above-stated requirements when the packaging is used as prescribed. In addition, a description of the packaging is provided with an illustration and/or drawings to allow the user/shipper to obtain the packaging and verify that the packaging hardware complies with all the specifications of the tested packaging.

By itself, this document does not ensure total compliance with all documentation necessary for making a shipment of radioactive material. In addition to documentation of tests, the shipper must maintain on file other appropriate documentation such as comparison of the physical properties of the actual contents to be shipped with those of the simulated payload used in testing to demonstrate equivalency. Also, implementation and documentation of a quality control program are required.

## 2.0 PACKAGING DESCRIPTION

The approved SWB design evaluated under Docket 01-53-7A is documented in Westinghouse Waste Isolation Division Drawing 165-F-001-W1, Revisions L and M; Drawings 165-F-001-W2 and W3, Revisions B and C; and Specification E-I-343, Revision 4, as provided in Appendix B of this report. Packaging dimensions can be found in Table 2-1. Packaging weights are provided in Table 2-2. Refer to Table 2-3 for the detailed materials/method of construction information. Design measurements noted for this packaging are provided in metric units and converted to English units. Measurements are nominal (2.54 cm = 1 in.).

Table 2-1. Dimensions.

Standard Waste Box	Height cm (in.)	Width cm (in.)	Length cm (in.)
External	93.98 (37.0)	138.43 (54.5)	180.34 (71.0)
Internal	93.22 (36.7)	132.08 (52.0)	174.50 (68.7)

Table 2-2. Nominal Weights.

Item	Weight kg (lb)
Gross weight	1,814.37 (4,000)
Empty packaging (approximate)	290.30 (640)
Payload of packaging (approximate)	1,519.53 (3,350)

A general description of the SWB design is as follows: The lid and body are made of 10-gauge carbon steel. The lid incorporates a lid lift nut that may be used for lifting the lid only. The gasket assembly is made of closed cell rubber, and is cut with a knife die. Forty-two ½ in. – 13 unified national course thread (UNC) x 1 ¾-in. socket flat head cap screws secure the lid to the body. The cap screws are secured by applying a non-locking liquid anaerobic thread sealant prior to placing into position. The cap screws are threaded into rivets that are installed in the body tube. The rivets may be manufactured or can be supplied off-the-shelf. The rivets may be procured from RIVNUT<sup>1</sup> Engineered Products, Part Number S50-3069. The SWB has two flat sides that each incorporate three lift clips (six total) on the upper-most portion of the box body. The ends of the container are rounded and each incorporate two body bumpers (four total). The body bumpers are located on the upper and lower portion of the body. The box body contains four recessed National Pipe Thread (NPT), ¾-in. pipe couplings. Two couplings are located on each of the flat sides of the box. A maximum of two commercial quality ¾-in. pipe plugs (National Pipe Thread Fine [NPTF] or Pipe Thread Fine [PTF]) are installed in the pipe couplings; and a minimum of two NucFil<sup>2</sup> -013, ¾-in. NPT filters are installed in the pipe couplings. Thread tape is used prior to installing the plugs or filters. The SWB is painted according to the user's specifications.

<sup>1</sup> Rivnut is a trademark of the B. F. Goodrich Company.

<sup>2</sup> NucFil is a trademark of Nuclear Filter Technology, Incorporated.

Table 2-3. Materials/Method of Construction

Item/component	Description
Container lid and body	10 gauge, ASTM A 569 or ASTM A 570, Grade 30 minimum, hot rolled sheet, carbon steel
Lid frame bar	Flat bar, ½ in. x 1 ¾ in., ASTM A 36
Lid lift nut	Steel bar, round ø 1 ¼ in., ASTM A 108, Grade 1018, cold drawn
Body tube frame	Rectangular tube, 1 ½ in. x 2 in. x 11 gauge, ASTM A 513, Type 1 or 2, Grade 1008 through 1020
Body bumper	4 total; square tube, 1 in. x 1 in. x 0.063 in., ASTM A 513, Type 1 or 2, Grade 1008 through 1020
Body lift clips	6 total; flat bar, 3/8 in. x 1 in., ASTM A 36 carbon steel
Pipe couplings	4 total; NPT, ¾ in., steel, welded or seamless, ASTM A 865, recessed taper-tapped, extra strong
Pipe plugs	2 maximum; ¾ in. alloy steel, socket, NPTF or PTF, commercial quality
Filters	2 minimum; NucFil <sup>a</sup> -013, ¾ in., NPT
Gasket assembly	Closed cell rubber, ½ in. x 1 ½ in., ASTM D 1056, Type 2, Class A, Grade 2, Suffix A <sub>1</sub> and F <sub>1</sub> (four pieces with adhesive back)
Cap screws	42 total; alloy steel, ½ in. – 13 UNC x 1 ¾ in. ASTM F 835, socket flat head countersunk
Rivet	42 total; steel bar, round ø AR, ASTM A 576, Grade 1008, 1010, 1018, or 1110 (or RIVNUT <sup>b</sup> Engineered Products, Part Number S50-3069)

NOTE: Information is per Westinghouse Waste Isolation Division, Drawing No. 165-F-001-W1, Rev. M; 165-F-001-W2 and W3, Rev. C; and Specification E-I-343, Rev. 4.

ASTM = American Society for Testing and Materials

NPT = National Pipe Thread

NPTF = National Pipe Thread Fine

PTF = Pipe Thread Fine

<sup>a</sup>NucFil is a trademark of Nuclear Filter Technology, Incorporated.

<sup>b</sup>Rivnut is a trademark of The B. F. Goodrich Company.

## 2.1 AUTHORIZED CONFIGURATIONS

The authorized configuration evaluated under Docket 01-53-7A consists of the container body and lid made from 10 gauge carbon steel, and as described in Section 2.0, Appendix A, and Appendix B of this report. A minimum of 2 NucFil-013, ¾-in. NPT filters are located in either side of the container body. A maximum of 2, ¾-in. pipe plugs, NPTF or PTF are located in either side of the container body. The containment system includes a cellular rubber gasket assembly, and 42, ½-in.-13 UNC x 1 ¾-in. socket flat head countersunk cap screws. The cap screws are secured by tightening into the 42 threaded rivets that are installed in the body tube.

## 2.2 CONTAINMENT SYSTEM

The SWB is a filtered packaging. As a minimum, 2 NucFil-013 filters must be installed for use. Containment is provided by the container body, lid, gasket, filters, plugs, fasteners (42 cap screws), and rivets (42 threaded).

## 2.3 AUTHORIZED CONTENTS

Information concerning simulated contents used during testing by Mound in 1988 and 1989 may be found in Section 2.4 of this report.

Based on the testing and evaluation of the SWB, the approved configurations described in Section 2.0, Appendix A, and Appendix B, may be used for shipping Type A solid, radioactive materials, normal form, material form numbers 1, 2, 3, 4, and 5. A description of each form is described below and may also be found in DOE/RL-96-57, Volumes 1 and 2:

- Material form number 1 - Solids of any particulate size.

A packaging certified for these contents is expected to contain radioactive contents of any representative particulate size.

- Material form number 2 - Solids of large particulate size only (i.e., sand, concrete, debris, soil).

Contents of a corresponding particulate size, such as soil or construction debris. (Glass or plastic labware having fine particulate available for dispersion would not fit this category and would require a packaging certified for fine particulate, material form number 1.)

- Material form number 3 - Solid material with no removable or dispersible contamination. (For definition, see 49 CFR 173.443, "Contamination Control.")

1. Metals with activation products;
2. Forms of metals/alloys/compounds of uranium, thorium;
3. Solid materials with the radioactive material firmly fixed in place, possibly by the application of a fixing media (i.e., paint);
4. Solidified material.

- Material form number 4 - Solids as described in material form number 3 above, including large, bulky, dense objects with sharp and obtrusive members or components, but having material form number 1 and/or number 2 as dispersible contaminants associated with the material (e.g., steel plates, motors, valves, steel pipes, concrete blocks).

- Material form number 5 – Four 208 L (55 gal) drums [in any arrangement not exceeding 453.592 kg (1,000 lb) per drum] and overpacked within the SWB.

Note: This is an example only and each form must be analyzed for compliance with the "no removable or dispersible contamination" criterion found in 49 CFR 173.443. Additional restrictions on contents can be found in Section 6.0 of this report.

## **2.4 TEST CONTENTS**

The simulated payload used for testing purposes by Mound in 1988 and 1989 was represented as follows:

- Flour, fluorescein, and sand to a weight of 1,832.51 kg (4,040 lb) to represent material form numbers 1 and 2.
- Flour, fluorescein, and debris to a weight of 1,856.10 kg (4,092 lb) to represent material form numbers 1, 3, and 4.
- Flour, fluorescein, and four steel drums to a weight of 1,859.73 kg (4,100 lb) to represent material form numbers 1 and 5.

## **2.5 LOADING, ASSEMBLY, AND CLOSURE**

The packagings are to be assembled, loaded, and closed in accordance with Westinghouse Waste Isolation Division, Specification E-I-343, Revision 4, as provided in Appendix B of this report. The approved packaging configurations for use with radioactive solids, material form numbers 1, 2, 3, 4, and 5 are described in Section 2.0, Appendix A, and Appendix B (Westinghouse Waste Isolation Division Drawing 165-F-001-W1, Revisions L and M; and 165-F-001-W2 and W3, Revisions B and C) of this report.

## **3.0 EVALUATION CRITERIA**

### **3.1 TEST CRITERIA**

The following criteria was used during testing:

When subjected to the tests specified in 49 CFR 173.465, the packaging will prevent the following:

- Loss or dispersal of the radioactive contents; and



- Any significant increase in the radiation levels recorded or calculated at the external surfaces as compared to the condition before the test.

**Note: The shipper must ensure that the amount of radiation at any surface of the packaging would not increase by more than 20% as a result of the decrease in distance to the center of the package load or because of shifting of the load [TS-R-1 (ST-1 Revised), Paragraph 646(b)].**

**Caution: Testing was conducted using a uniform distributed load. No consideration was given to point sources being in the package. It is the responsibility of the shipper to use the damage information provided within this report to determine if a significant change in radiation level would result for a specific load. Note that point sources within the load require that the shipper use extreme caution.**

### 3.2 PASS/FAIL CRITERIA

For all tests, except where otherwise indicated, the packages tested were considered to fail if there was significant damage to the packaging and/or loss of the simulated load.

## 4.0 PACKAGING EVALUATION RESULTS

The following list shows the primary sections of 49 CFR applicable to Type A packaging. Each of these regulations for which identification and documentation of compliance are presented in the PQCL, attached in Appendix A, are marked with an asterisk (\*). It is the responsibility of the user of the package to ensure compliance with the unmarked regulations and with the parts identified within the PQCL as "the responsibility of the shipper."

- 173.24 General Requirements for Packagings and Packages\*
- 173.24a Additional General Requirements for Non-Bulk Packagings and Packages\*
- 173.24b Additional General Requirements for Bulk Packagings\*
- 173.27 General Requirements for Transportation by Aircraft\*
- 173.410 General Design Requirements\*
- 173.412 Additional Design Requirements for Type A Packages\*
- 173.415(a) Authorized Type A Packages

- 173.442 Thermal Limitations
- 173.461 Demonstration of Compliance with Tests
- 173.462 Preparations of Specimens for Testing\*
- 173.465 Type A Packaging Tests\*
- 173.466 Additional Tests for Type A Packagings Designed for Liquids and Gases\*
- 173.474 Quality Control for Construction of Packaging
- 173.475 Quality Control Requirements Prior to Each Shipment of Class 7 (Radioactive) Materials
- 178.3 Marking of Packagings\*
- 178.350 Specification 7A; General Packaging, Type A
- 178.608 Vibration Standard.

#### **4.1 DESIGN EVALUATION**

Design evaluation and previous testing information, as applicable Type A regulations outlined in 49 CFR, may be found in Appendix A. Appendix A provides a PQCL that was used by DFSNW to evaluate the ability of the SWB packaging configurations under Docket 01-53-7A to meet performance-related regulations. Evaluation of the approved SWB designs under Docket 01-53-7A includes the following:

- Westinghouse Waste Isolation Division Drawing 165-F-001-W1, Revisions L and M; and 165-F-001-W2 and W2, Revisions B and C.
- Westinghouse Waste Isolation Division, Specification E-I-343, Revision 4, *Specification for the TRUPACT-II Standard Waste Box*.

Compliance with all the indicated regulations will signify that the packaging has met the design and performance testing requirements for a DOT-7A Type A packaging.

## 5.0 CONCLUSION

The evaluation and previous testing indicates that the SWB packaging configurations (as described in Section 2.0, Appendix A, and Appendix B of this report) meet applicable DOT-7A Type A design and compliance test requirements.

The packaging should be loaded, assembled, and closed as described in this document. The approved packaging configurations are authorized for shipment of radioactive solids, material form numbers 1, 2, 3, 4, and 5 (DOE/RL-96-57 Volumes 1 and 2). Deviations from the approved, as-tested packaging system configurations will require retesting or approval by the DOE.

### 5.1 RESTRICTIONS/SPECIFICATIONS

The following restrictions/specifications shall be observed:

1. The SWB shall be operated in accordance with the following U.S. Department of Energy (DOE)-approved documentation, and as provided in DOE/RL-96-57, Volumes 1 and 2:
  - Docket 98-45-7A:
    - Westinghouse Waste Isolation Division Drawings:  
165-F-001-W1, Revisions F through K  
165-F-001-W2, Revision A  
165-F-001-W3, Revision A.
    - Westinghouse Electric Company, Waste Isolation Division, Specification E-I-343, Revision 3, *Specification for the TRUPACT-II Standard Waste Box*.
  - Docket 01-53-7A:
    - Westinghouse, TRU Solutions LLC, Waste Isolation Pilot Plant Drawings:  
165-F-001-W1, Revisions L and M  
165-F-001-W2, Revisions B and C  
165-F-001-W3, Revisions B and C.
    - Westinghouse Electric Company, Waste Isolation Division, Specification E-I-343, Revision 4, *Specification for Fabrication of the Standard Waste Box*.
2. Inspect rivets for damaged threads and loose fit. If any rivets require adjustment or replacement, follow the guidance provided in Specification E-I-343.

3. Install a minimum of two NucFil-013 filters in any of the four filter mounting locations. Filters shall be installed by first applying thread sealant tape or compound to the filter body pipe threads. Next, insert the filters into the filter mounting locations and tighten to a final torque of  $13.56 \pm 6.78$  N-m ( $10 \pm 5$  ft-lb).

Note: Users may have difficulty installing the filter as it is a straight thread and the coupling is a tapered thread.

Note: The rubber gasket supplied with the filter can be removed at the user's option prior to installation of the filter. The SWB relies on the mechanical interface of the pipe threads with thread sealant to generate a leak-tight joint.

4. Install a maximum of two pipe plugs in any remaining open mounting locations. Plugs shall be installed by first applying thread sealant tape or compound to the plug pipe threads. Next, insert the plugs into the mounting locations and tighten to a final torque of  $13.56 \pm 6.78$  N-m ( $10 \pm 5$  ft-lb).
5. Ensure that the gasket assembly is not ripped or torn. Wipe the gasket sealing surface of the body and lid to remove any loose debris. Install the gasket according to Specification E-I-343. The gasket material must have an operating range of  $-40$  °C to  $70$  °C ( $-40$  °F to  $158$  °F).
6. A lifting attachment point is located in the center of the lid and will accept a  $\frac{1}{4}$  in. – 20 UNC lifting eye.

Caution: The lid lifting point is for the lid only!

7. Coat all lid screw threads with a non-locking liquid anaerobic thread sealant prior to placing into position. Install the four corner screws. Install the middle screws on the straight sides. Install the middle screws on the curved ends. Install the remaining screws in any sequence. Using a calibrated torque wrench, pre-torque all screws in crisscrossing pattern to  $40.68$  ( $-0, +13.56$ ) N-m [ $30$  ( $-0, +10$ ) ft-lb]. Torque all screws in a crisscrossing pattern to a final torque of  $67.8$  ( $-0, +13.56$ ) N-m [ $50$  ( $-0, +10$ ) ft-lb].

Note: If needed, a lineup bar may be used to pull the lid into position with the body. Be careful not to damage the rivet threads. If the threads are damaged, repair as stated in Specification E-I-343.

8. For heavy, bulky materials (e.g., concrete chunks, motors, and pumps), equipment or materials with sharp corners or protrusions, or material/equipment geometries that could result in highly localized forces, the shipper must ensure that the contents are securely fastened/positioned within the package to prevent damage within the packaging.
9. The shipper shall ensure that the amount of radiation at any surface would not increase by more than 20% [TS-R-1 (ST-1 Revised), Paragraph 646(b)].

The shipper is the organization that actually uses the packagings and therefore is responsible to make sure they are used in accordance with their designs. The shipper shall ensure that the design is suitable in all respects for the contents to be shipped. If it is not suitable, testing/analysis must be conducted and documented to demonstrate Specification 7A compliance with the actual contents. The design will dictate many of the limits placed on the contents, such as mass and physical form.

## **6.0 QUALITY ASSURANCE PROGRAM**

The quality assurance program implemented by the shipper's organization must implement actions to provide adequate confidence that the shipment will comply with the regulations. The following regulatory requirements address quality control applicable to Type A packaging.

Paragraphs 173.474 and 173.475 that are restated below provide the quality control elements prescribed in 49 CFR. These requirements must be met for all shipments.

### **173.474. Quality Control for Construction of Packaging**

**Prior to the first use of any packaging for the shipment of Class 7 (radioactive) material, the shipper shall determine that--**

- a. The packaging meets the quality of design and construction requirements as specified in this subchapter; and**
- b. The effectiveness of the shielding, containment, and, when required the heat transfer characteristics of the package, are within the limits specified for the package design.**

### **173.475. Quality Control Requirements Prior to Each Shipment of Class 7 (Radioactive) Materials**

**Before each shipment of any Class 7 (radioactive) materials package, the offeror must ensure, by examination or appropriate tests, that--**

- a. The packaging is proper for the contents to be shipped;**
- b. The packaging is in unimpaired physical condition, except for superficial marks;**
- c. Each closure device of the packaging, including any required gasket, is properly installed, secured, and free of defects;**

- d. For fissile material, each moderator and neutron absorber, if required, is present and in proper condition;**
- e. Each special instruction for filling, closing, and preparation of the packaging for shipment has been followed;**
- f. Each closure, valve, or other opening of the containment system through which the radioactive content might escape is properly closed and sealed;**
- g. Each packaging containing liquid in excess of an A<sub>2</sub> quantity and intended for air shipment has been tested to show that it will not leak under an ambient atmospheric pressure of not more than 25 kPa, absolute (3.6 psia). The test must be conducted on the entire containment system, or on any receptacle or vessel within the containment system, to determine compliance with this requirement;**
- h. The internal pressure of the containment system will not exceed the design pressure during transportation; and**
- i. External radiation and contamination levels are within the allowable limits specified in this subchapter.**

It is critical that controls are in place to ensure that the packaging hardware to be used complies with the specifications given for the packaging hardware tested, described, and evaluated in this document. Each shipper must have a documented program that describes how this is achieved, and the degree of certainty, in addition to documentation (audit trail) that demonstrates compliance. The quality assurance program is mandated in DOE O 414.1A, *Quality Assurance*.

## **7.0 PRIMARY USER**

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## 8.0 REFERENCES

- 49 CFR, "Transportation," Parts 100 to 177 and Parts 178 to 199, *Code of Federal Regulations*, as amended.
- ASME Boiler and Pressure Vessel Code, 1998, Section IX, *Welding and Brazing Qualifications*, American Society of Mechanical Engineers.
- AWS D1.1: 2000, *Structural Welding Code – Steel*, An American National Standard, 17<sup>th</sup> Edition, American Welding Society, Miami, Florida.
- DFSNW-QAM-001, *Quality Assurance Manual*, Duratek Federal Services Inc., Northwest Operations, Richland, Washington.
- DOE O 414.1A, 1999, *Quality Assurance*, U.S. Department of Energy, Washington, D.C.
- DOE/RL-96-57, Volume 1, *Test and Evaluation Document for DOT Specification 7A Type A Packaging*, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
- DOE/RL-96-57, Volume 2, *Test and Evaluation Document for DOT Specification 7A Type A Packaging*, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
- E-I-343, Revision 3, *Specification for the TRUPACT-II Standard Waste Box*, Westinghouse Electric Company, Waste Isolation Division, Carlsbad, New Mexico.
- E-I-343, Revision 4, *Specification for Fabrication of the Standard Waste Box*, Westinghouse Electric Company, Waste Isolation Division, Carlsbad, New Mexico.
- Edling, D. A., 1988, *DOT Spec 7A Evaluation Document for WIPP Standard Waste Steel Box (SWB)*, August 15, 1988, Mound, Miamisburg, Ohio.
- Edling, D. A., 1989, *DOT Spec 7A Evaluation Document for TRUPACT-II Standard Waste Box*, April 19, 1989, EG&G Mound Applied Technologies, Miamisburg, Ohio.
- HNF-SD-TP-TI-006, Revision 1, *Documentation and Verification Required for Type A Packaging*, Duratek Federal Services Inc., Northwest Operations, Richland, Washington.
- TS-R-1 (ST-1 Revised), 1996 Edition (Revised), IAEA Safety Standards Series, *Regulations for the Safe Transport of Radioactive Material*, International Atomic Energy Agency, Vienna, Austria.

**APPENDIX A**

**DOT-7A, TYPE A PACKAGING QUALIFICATION CHECKLIST**



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## 1.0 CONTENTS CHARACTERIZATION

### 1.1 RADIOLOGICAL

In the following table, identify the radionuclides present in the material. Identify the specific isotopes and for each isotope present, identify the quantity in becquerel. If the material is special form, identify the  $A_1$  value; if normal form, identify the  $A_2$  value. Identify the weight in grams of the radionuclides present in the material when known. If nuclide is fissile, identify it as such. Identify the decay heat. Determine the total for each column.

RADIONUCLIDES	QUANTITY (per package)					DECAY HEAT
	Becquerel	$A_1$	$A_2$	Grams	Grams Fissile	Watts/gram
<p><i>The intent of this table is for the shipper to identify the radionuclides present in material; identify the weight in grams of the radionuclides present in the material when known; identify the decay heat; and determine the total for each column.</i></p> <p><i>The DOT-7A Type A testing and evaluation activities for this packaging are recorded under Mound documentation, and under Dockets 89-07-7A, 98-45-7A, and 01-53-7A. The information on the Standard Waste Box (SWB) designs tested and evaluated under the U.S. Department of Energy's (DOE) DOT-7A Type A Testing Program may be found in the following supporting documentation:</i></p> <ul style="list-style-type: none"> <li><i>Mound – "DOT Spec 7A Evaluation Document for WIPP Standard Waste Steel Box (SWB)," Don A. Edling, Mound, August 15, 1988.</i></li> <li><i>Mound – "DOT Spec 7A Evaluation Document for TRUPACT-II Standard Waste Box," Don A. Edling, EG&amp;G Mound Applied Technologies, April 19, 1989.</i></li> <li><i>Docket 89-07-7A – "Test and Evaluation Document for DOT Specification 7A Type A Packaging," DOE/RL-96/57, Vol. 1, U.S. Department of Energy (formerly WHC-EP-0558, Rev. 3).</i></li> <li><i>Docket 98-45-7A – "Test and Evaluation Document for DOT Specification 7A Type A Packaging," DOE/RL-96-57, Vol. 2, U.S. Department of Energy.</i></li> <li><i>Docket 01-53-7A – "Test and Evaluation Document for DOT Specification 7A Type A Packaging," DOE/RL-96-57, Vol. 2, U.S. Department of Energy</i></li> </ul> <p><b>NOTE:</b> DOE/RL-96-57, Volumes 1 and 2 are available under the following Internet address:  <a href="http://www.hanford.gov/pss/t&amp;p/dot7a/pdot7a.htm">http://www.hanford.gov/pss/t&amp;p/dot7a/pdot7a.htm</a> or <a href="http://www.rampac.com">http://www.rampac.com</a></p> <p><i>The user of the approved SWB configurations tested and evaluated will have the responsibility to assure compliance with the DOT-7A Type A requirements for the characterization of contents at the time of shipment. When used as a standalone, Type A packaging, the contents of the SWB are limited to:</i></p> <ul style="list-style-type: none"> <li><i>Type A quantities of radionuclides (the contents will not exceed the limits of the radionuclides as prescribed in 49 CFR 173.431 through 173.435)</i></li> <li><i>Fissile exempt</i></li> <li><i>Normal form</i></li> <li><i>Solids (material form numbers 1, 2, 3, 4, and 5)</i></li> <li><i>No liquids or gases.</i></li> </ul>						

(Use extra sheets if needed.)

Using the identified radionuclides determine the associated radiation types.

- ☐ Photons (X and gamma rays)
- ☐ Alpha particles
- ☐ Beta particles ( includes positrons)
- ☐ Neutron particles
- ☐ Other important radiations. Identify.

*The user is responsible for identifying the associated radiation types.*

## 1.2 PHYSICAL FORM

### 1.2.1 Weight/Density

Identify the total weight in grams for the material in which the radioactivity is distributed.

*Approximate payload: 1,519.53 kg (3,350 lb).*

*The maximum gross weight of the SWB: 1,814.37 kg (4,000 lb).*

*The nominal weight of an empty SWB: 290.30 (640 lb).*

Identify the density of the load.

Density of the load \_\_\_\_\_(kg/m<sup>3</sup>)

### 1.2.2 Phase Solid, Liquid, or Gas

Identify if material is special form or normal form. Determine the physical form of the material. Identify if it is a solid, liquid or gas. If the material is a solid, identify if it is considered form 1, 2, 3, or a heavy, bulky solid. For heavy, bulky materials (e.g., concrete chunks, motors, and pumps), equipment/materials with sharp corners or protrusions, or material/equipment geometries that could result in highly localized forces, ensure that the contents are securely fastened/positioned within the package to prevent damage to the packaging. Identify the density of the material. For liquids identify the specific gravity and viscosity. For gas identify the volume at standard temperature and pressure (STP). Indicate if a phase change(s) can occur over the required temperature range.

Form Category: ☒ Normal ☐ Special (see 49 CFR 173.469)

Physical Form: ☒ Solid ☒ Form 1 ☒ Form 2 ☒ Form 3

☒ Heavy, bulky solid requiring dunnage.

*Refer to next page for additional material form information.*

**Physical Form: (continued)**

*Five material forms are authorized. The shipper must determine the most appropriate form for the particular contents being shipped.*

- *Material form 1: Solids—any particle size.*
- *Material form 2: Solids—large particle size only (e.g., sand, concrete, debris, soil).*
- *Material form 3: Solids—objects with no significant or removable contamination. (For definition see 49 CFR 173.443, Contamination control.)*
- *Material form 4: Solids as described in material form number 3 above, including large, bulky, dense objects with sharp and obtrusive members or components, but having material form number 1 and/or number 2 as dispersible contaminants associated with the material (e.g., steel plates, motors, valves, steel pipes, concrete blocks).*
- *Material form 5: Four 208-L (55-gal) drums (in any arrangement not exceeding 453.59 kg (1,000 lb) per drum) and overpacked within the SWB.*

☐ [ NA ] Liquid

Specific gravity: \_\_\_\_\_

Viscosity: \_\_\_\_\_

☐ [ NA ] Gas

Volume: \_\_\_\_\_ (cm<sup>3</sup> at STP)

Phase Change:

☐ [ ] Phase

☐ [ ] No Phase change

*The user is responsible for identifying if a phase change can occur over the required temperature range.*

**1.3 THERMAL**

Using the information on decay heat identified in the radioisotope table above, determine the thermal load resulting from decay heat.

Total wattage from decay heat: \_\_\_\_\_ (watts/package)

Total wattage from other sources: \_\_\_\_\_ (watts/package)

Total wattage of contents: \_\_\_\_\_ (watts/package)

*The user is responsible for identifying the thermal load resulting from the decay heat.*

## 1.4 CHEMICAL

Identify the chemical characteristics of the material that makes up the load. The basic chemical makeup of the contents being shipped must be understood to adequately design or select a packaging. Identify chemical properties that would make the packaging harmful to common packaging materials. Identify any materials that would be classed as hazardous materials if they were not radioactive. This would result in the identification of materials that were hazardous because they are explosive, flammable, poisonous, combustible, dangerous when wet, oxidizers, corrosives, irritants, or another hazard. It is suggested that the material be identified by the proper shipping name and identification number from the Hazardous Materials Table (49 CFR 172.101) it would have if it were not radioactive. Space is provided on the following table for the information. Identify the quantities of each material that will be in the load.

If the package will contain organic substances, identify them and the quantity expected to be present in a single package. Also, watch for materials that are pyrophoric or materials that react with air or water.

### 1.4.1 Chemical Compatibility

List the chemical properties that may make the material being shipped incompatible with common packaging materials.

*The user is responsible for listing the chemical properties for the material to be shipped to ensure compatibility with the packaging materials.*

### 1.4.2 Hazardous Materials Proper Shipping Names

PROPER SHIPPING NAME	IDENTIFICATION NUMBER	EXPECTED QUANTITY (per package)		
		Solids (grams)	Liquids (ml)	Gases (cm <sup>3</sup> at STP)
<p><i>The intent of this table is for the shipper to identify the chemical characteristics of the material that makes up the load. The basic chemical makeup of the contents being shipped must be understood to adequately design or select a packaging.</i></p> <p><i>Identify the chemical properties that would be harmful to common packaging materials; and identify any materials that would be classed as hazardous materials if they were not radioactive (i.e., explosive, poisonous, combustible, dangerous when wet, oxidizers, corrosives, or other). Watch for materials that are pyrophoric (react with air).</i></p> <p><i>Non-radioactive constituents will be identified by the waste generator and entered onto the shipping papers. The shipper is responsible for documenting compatibility of the load with the packaging.</i></p>				

(Use extra sheets if needed.)

**1.4.3 Organic Chemicals**

<b>NAME OF ORGANIC CHEMICALS</b>	<b>EXPECTED QUANTITY (per package)</b>
<p><i>The intent of this table is for the shipper to identify if the package will contain organic substances. Identify what these substances are and the quantity expected to be present in a single package. Also, watch for materials that are pyrophoric (react with air).</i></p> <p><i>The shipper is responsible for documenting compatibility of the load with the packaging.</i></p>	

(Use extra sheets if needed.)



## 2.0 CLASSIFICATION OF CONTENTS

### 2.1 IS THE MATERIAL RADIOACTIVE?

Determine if material is radioactive for transportation. Divide the total radioactive in becquerel (Section 1.1) by the weight of the material in grams (Section 1.2.1)

$$\frac{\text{Total activity Bq}}{\text{Total material g}} = X \text{ Bq/g}$$

*If  $X > 70$  material is radioactive for transportation.*

For transportation, the material is classified as: ☐ Radioactive ☐ Nonradioactive

*The user is responsible to determine if material is radioactive or nonradioactive.*

### 2.2 IS THE MATERIAL NONFISSILE OR FISSILE EXEMPT?

Are fissile nuclides present? If no, the material is nonfissile. If yes, can the material meet the conditions in 10 CFR 71.53? If yes, the material is fissile exempt. If no, the material is fissile and requires a certified packaging. Check the appropriate box.

☐ Nonfissile ☐ Fissile Exempt ☐ Fissile (Certified Package Required)

*The user is responsible to determine if the material is nonfissile or fissile exempt.*

### 2.3 CAN TYPE A QUANTITY LIMITS BE MET?

If more than one nuclide is present, determine the  $A_1$  or  $A_2$  value, as applicable, for the mixture. If only one nuclide is present, use the value from the table. Determine if the total activity to be placed in the package is less than or equal to a Type A quantity.

$A_1$  or  $A_2$  value calculated or from table \_\_\_\_\_ TBq.

Type A quantity present ☐ Yes ☐ No

If yes, identify the proper shipping name from 49 CFR 172.101 Hazardous Materials Table.

---

For the identified proper shipping name, does the entry in column 8 (Packaging) identify 49 CFR 173.415?

49 CFR 173.415 referenced. ☐ Yes ☐ No

*The user is responsible for determining if the Type A quantity limits are met.*

### 3.0 PACKAGING SELECTION

#### 3.1 AUTHORIZED TYPE A PACKAGING CATEGORY SELECTED

The DOT authorizes four categories of packagings for use when shipping Type A quantities of radioactive material. Identify the category selected.

☒ Specification 7A, General Packaging, Type A. For packaging in this category, completion of this checklist will identify required documentation.

***The SWB design has been tested and evaluated as meeting the performance and design requirements for a DOT-7A Type A packaging as required by 49 CFR 178.350.***

☐ Other Type A Packagings. When using other Type A packagings, be sure to register as a user and follow all conditions of use identified for the packaging.

☐ Type B Packagings. When using a Type B packaging, be sure to register as a user and follow all conditions of use identified for the packaging. If using a Type B packaging as a Type A packaging, conduct required evaluations. The documentation requirements identified in this document apply to a Type B packaging as a Type A packaging.

☐ Foreign-made Packagings. When using a foreign-made packaging, obtain the packaging's documentation and verify the packaging was used for import. While not directly applicable, this checklist provides some idea of the type of documentation that should be found.

- ☐ Packaging meets the standards in International Atomic Energy Agency (IAEA) *Regulations for the Safe Transport of Radioactive Material, 1995 Edition*, Safety Series No. 6 (IAEA 1990) and bears the marking "Type A."
- ☐ Packaging was used for the import of Class 7 (radioactive) materials.
- ☐ Possess the applicable documentation of tests and engineering evaluations and maintain the documentation on file in accordance with 49 CFR 173.415(a).

#### 3.2 PHYSICAL CHARACTERISTICS OF THE LOAD

Selection of a proper packaging requires knowledge of the physical characteristics of the load. Space is provided in the following subsections to identify where the documentation for the radiological, physical, thermal, and chemical data for the load is found. The information is needed to document compatibility of the load with the packaging.

##### 3.2.1 Radiological Characteristics

If not provided in Section 1 of the checklist, identify where the documentation of radionuclides present in the load can be found.

***The user is responsible for identifying this information prior to shipment.***

### **3.2.2 Physical Characteristics**

If not provided in Section 1 of the checklist, identify where the documentation of physical characteristics of the load can be found.

*The user is responsible for identifying this information prior to shipment.*

### **3.2.3 Physical Phase, Solid, Liquid, or Gas**

If not provided in Section 1 of the checklist, identify where the documentation of physical characteristics of the load can be found.

*The user is responsible for identifying this information prior to shipment.*

### **3.2.4 Gas Generation**

If not provided in Section 1 of the checklist, identify where the documentation of gas generation by the load can be found.

*The user is responsible for identifying this information prior to shipment.*

### **3.2.5 Thermal**

If not provided in Section 1 of the checklist, identify where the documentation on thermal characteristics of the load can be found.

*The user is responsible for identifying prior to shipment.*

### **3.2.6 Chemical Characteristics**

If not provided in Section 1 of the checklist, identify where the documentation of chemical characteristics of the load can be found.

*The user is responsible for identifying prior to shipment.*

### 3.2.7 Transportation Mode Differences

Identify the mode of transportation.

☐ Aircraft. ☒ Highway, rail, vessel.

If shipment is by aircraft, identify if the package contents are liquid, solid, or gas.

☐ Liquid. ☒ Solid. ☐ Gas.

If shipment is by air and is liquid, does the packaging meet the minimum pressure differential of 95 kPa (13.8 lb/in<sup>2</sup>).

☐ Yes. ☒ No, do not use packaging for shipment of liquid by aircraft.

If liquid, do the contents require the ability to meet a higher differential pressure? If yes, identify the pressure required and documentation that shows the packaging meets the requirement.

***The SWB is not authorized for transporting liquids. In addition, the SWB is vented and shall not be used for transport via aircraft.***

Is the packaging vented?

☐ No. ☒ Yes, do not use packaging for shipment by aircraft.

Are closures held securely in place and prevented from loosening due to vibration and temperature changes?

☒ Yes. ☐ No, do not use packaging for shipment by aircraft.

***Although the SWB closures are held securely in place and are not affected by vibration and temperature changes, the SWB is not authorized for shipment via aircraft.***

## 4.0 REGULATORY REQUIREMENTS

### 4.1 49 CFR 173.24 GENERAL REQUIREMENTS FOR PACKAGINGS AND PACKAGES.

#### 173.24(a) Applicability.

(a) **Applicability.** Except as otherwise provided in this subchapter, the provisions of this section apply to--

- (1) Bulk and non-bulk packagings;
- (2) New packagings and packagings which are reused; and
- (3) Specification and non-specification packagings.

All DOT-7A, Type A packagings fall into one or more of the identified categories. Indicate below the type of documentation that shows this requirement is met and where the documentation can be found.

Addressed in:	<input checked="" type="checkbox"/> Drawing	<input type="checkbox"/> Operating Instruction
	<input checked="" type="checkbox"/> Specification	<input type="checkbox"/> Manufacturer Supplied Data
	<input checked="" type="checkbox"/> Analysis Report	<input type="checkbox"/> Similarity or Documented Record

Specify:

*The DOT-7A Type A testing and evaluation activities for this packaging are recorded under Mound documentation, and under Dockets 89-07-7A, 98-45-7A, and 01-53-7A. The information on the SWB designs tested and evaluated under the DOE's DOT-7A Type A Testing Program may be found in the following supporting documentation:*

- *Mound -- "DOT Spec 7A Evaluation Document for WIPP Standard Waste Steel Box (SWB)," Don A. Edling, Mound, August 15, 1988.*
- *Mound -- "DOT Spec 7A Evaluation Document for TRUPACT-II Standard Waste Box," Don A. Edling, EG&G Mound Applied Technologies, April 19, 1989.*
- *Docket 89-07-7A -- "Test and Evaluation Document for DOT Specification 7A Type A Packaging," DOE/RL-96-57, Vol. 1, U.S. Department of Energy (formerly WHC-EP-0558, Rev. 3).*
- *Docket 98-45-7A -- "Test and Evaluation Document for DOT Specification 7A Type A Packaging," DOE/RL-96-57, Vol. 2, U.S. Department of Energy.*
- *Docket 01-53-7A -- "Test and Evaluation Document for DOT Specification 7A Type A Packaging," DOE/RL-96-57, Vol. 2, U.S. Department of Energy.*

**NOTE:** DOE/RL-96-57, Volumes 1 and 2 are available under the following Internet address:  
<http://www.hanford.gov/pss/t&p/dot7a/pdot7a.htm> or <http://www.rampac.com>

*Evaluation of the approved SWB design under Docket 01-53-7A includes the following:*

- *Westinghouse Waste Isolation Division Drawings 165-F-001-W1, Revisions L and M; 165-F-001-W2, Revisions B and C; and 165-F-001-W3, Revisions B and C. [Note: the drawing revisions previously approved for use under Docket 98-45-7A consisted of Revisions F through K (sheet W1), and Revision A (sheets W2 and W3)].*
- *Westinghouse Waste Isolation Division, Specification E-I-343, Revision 4, "Specification for Fabrication of the Standard Waste Box." [Note: the specification revision previously approved for use under Docket 98-45-7A consisted of Revision 3.]*

*(Continued onto next page...)*

**173.24(a) Applicability. (continued)**

*The SWB may be considered as a bulk packaging. The gross weight is 1,814.37 kg (4,000 lb); the approximate weight of an empty SWB is 290.30 kg (640 lb); and the approved payload weight is approximately 1,519.53 kg (3,350 lb).*

*Type A packaging testing and evaluation activities base the SWB being used as a standalone, Type A packaging. The SWB is primarily used for shipment, and storage of waste materials that are intended for shipment to the Waste Isolation Pilot Plant (WIPP), located in Carlsbad, New Mexico.*

**173.24(b) Containment.**

(b) Each package used for the shipment of hazardous materials under this subchapter shall be designed, constructed, maintained, filled, its contents so limited, and closed, so that under conditions normally incident to transportation--

- (1) Except as otherwise provided in this subchapter, there will be no identifiable (without the use of instruments) release of hazardous materials to the environment;
- (2) The effectiveness of the package will not be substantially reduced; for example, impact resistance, strength, packaging compatibility, etc. must be maintained for the minimum and maximum temperatures encountered during transportation;
- (3) There will be no mixture of gases or vapors in the package which could, through any credible spontaneous increase of heat or pressure, significantly reduce the effectiveness of the packaging.

These requirements apply to DOT-7A, Type A packagings. Documentation of the ability of the packaging to meet the more severe requirements of 49 CFR 173, Subpart I, can be used to document compliance. Indicate below the type of documentation that shows these requirements are met and where the documentation can be found.

Addressed in:	<input checked="" type="checkbox"/> Drawing	<input type="checkbox"/> Operating Instruction
	<input checked="" type="checkbox"/> Specification	<input type="checkbox"/> Manufacturer Supplied Data
	<input checked="" type="checkbox"/> Analysis Report	<input type="checkbox"/> Similarity or Documented Record

Specify:

1. *The DOT-7A Type A testing and evaluation activities for this packaging are recorded under Mound documentation, and under Dockets 89-07-7A, 98-45-7A, and 01-53-7A. The information on the SWB designs may be found in the supporting documentation identified in Section 4.1, Page A-10. The SWB may be used with radioactive solids, material form numbers 1, 2, 3, 4, and 5 as identified in Section 2.3 of the final evaluation report. The intent of this requirement is met due to the design and materials of construction of the SWB.*

*Evaluation of the approved SWB designs under Docket 01-53-7A includes the following:*

- *Westinghouse Waste Isolation Division Drawing No. 165-F-001-W1, Revisions L and M.*
  - *Westinghouse Waste Isolation Division Drawing No. 165-F-001-W2, Revisions B and C.*
  - *Westinghouse Waste Isolation Division Drawing No. 165-F-001-W3, Revisions B and C.*
  - *Specification E-I-343, Revision 4, "Specification for Fabrication of the Standard Waste Box."*
2. *Same response as above.*
  3. *A total of four (4) filter mounting locations are provided. The packaging is vented to avoid pressure buildup by a minimum of two (2) NucFil-013 filters. The unused filter mounting locations are to remain plugged. It is the responsibility of the shipper to ensure that the payload remains stable during transport.*

**173.24(c) Authorized Packagings.**

- (c) Authorized packagings. A packaging is authorized for a hazardous material only if--
- (1) The packaging is prescribed or permitted for the hazardous material in a packaging section specified for that material in Column 8 of the §172.101 table and conforms to applicable requirements in the special provisions of Column 7 of the §172.101 table and, for specification packagings (but not including UN standard packagings manufactured outside the United States), the specification requirements in parts 178 and 179 of this subchapter; or
  - (2) The packaging is permitted under, and conforms to, provisions contained in §§171.11, 171.12, 171.12a, 173.3, 173.4, 173.5, 173.7, 173.27 or 176.11 of this subchapter.

DOT-7A, Type A packagings are authorized for packaging for Type A quantities of radioactive materials. Indicate below the type of documentation that shows the load is a Type A quantity and where the documentation can be found.

Addressed in:	<input checked="" type="checkbox"/> Drawing	<input type="checkbox"/> Operating Instruction
	<input checked="" type="checkbox"/> Specification	<input type="checkbox"/> Manufacturer Supplied Data
	<input checked="" type="checkbox"/> Analysis Report	<input type="checkbox"/> Similarity or Documented Record

Specify:

***DOT-7A Type A packagings are authorized packaging for Type A quantities of radioactive materials. The shipper is responsible for assuring the load meets the quantity and radiological limits.***

***The DOT-7A Type A testing and evaluation activities for this packaging are recorded under Mound documentation, and under Dockets 89-07-7A, 98-45-7A, and 01-53-7A. Evaluation of the approved SWB designs under Docket 01-53-7A meet the Specification 7A packaging requirements in accordance with 49 CFR 178.350, and include the following:***

- ***Westinghouse Waste Isolation Division Drawing No. 165-F-001-W1, Revisions L and M.***
- ***Westinghouse Waste Isolation Division Drawing No. 165-F-001-W2, Revisions B and C.***
- ***Westinghouse Waste Isolation Division Drawing No. 165-F-001-W3, Revisions B and C.***
- ***Specification E-I-343, Revision 4, "Specification for Fabrication of the Standard Waste Box."***

***It is the responsibility of the shipper to ensure that the packagings used are in compliance with the approved designs evaluated and tested as noted.***

**173.24(d) Specification Packagings and UN Standard Packagings Manufactured Outside the U.S.--**

***(d) Specification packagings and UN standard packagings manufactured outside the U.S. –***

***(1) Specification packagings.*** A specification packaging, including a UN standard packaging manufactured in the United States, must conform in all details to the applicable specification or standard in part 178 or part 179 of this subchapter.

A DOT-7A, Type A packaging is a specification packaging. Documentation of the ability of the package to meet the packaging requirements identified in 49 CFR 173.415(a) will document compliance with this requirement. Indicate below the type of documentation that shows this requirement is met and where the documentation can be found.

Addressed in:	<input checked="" type="checkbox"/> Drawing	<input type="checkbox"/> Operating Instruction
	<input checked="" type="checkbox"/> Specification	<input type="checkbox"/> Manufacturer Supplied Data
	<input checked="" type="checkbox"/> Analysis Report	<input type="checkbox"/> Similarity or Documented Record

Specify:

***The SWB is manufactured in the United States.***

***The DOT-7A Type A testing and evaluation activities for this packaging are recorded under Mound documentation, and under Dockets 89-07-7A, 98-45-7A, and 01-53-7A as provided in Section 4.1 on Page A-10. Evaluation of the approved SWB designs and materials of construction under Docket 01-53-7A include the following:***

- ***Westinghouse Waste Isolation Division Drawing No. 165-F-001-W1, Revisions L and M.***
- ***Westinghouse Waste Isolation Division Drawing No. 165-F-001-W2, Revisions B and C.***
- ***Westinghouse Waste Isolation Division Drawing No. 165-F-001-W3, Revisions B and C.***
- ***Specification E-I-343, Revision 4, "Specification for Fabrication of the Standard Waste Box."***

***By evaluation, it is determined that the noted SWB designs under Docket 01-53-7A meet the Specification 7A packaging requirements in accordance with 49 CFR 178.350.***

***It is the responsibility of the shipper to ensure that the packagings used are in compliance with the approved designs evaluated and tested as noted. In addition, the shipper is responsible to complete the DOT-7A Type A package requirements not met when the packaging is received for loading.***



**173.24(d) Specification Packagings and UN Standard Packagings Manufactured Outside the U.S.—**  
(continued)

**(2) *UN standard packagings manufactured outside the United States.*** A UN standard packaging, manufactured outside the United States, in accordance with national or international regulations based on the UN Recommendations of the Transport of Dangerous Goods, may be imported and used and is considered to be an authorized packaging under the provisions of paragraph (c)(1) of this section, subject to the following conditions and limitations:

- (i) The packaging fully conforms to applicable provisions in the UN Recommendations on the Transport of Dangerous Goods and the requirements of this subpart, including reuse provisions;**
- (ii) The packaging is capable of passing the prescribed tests in part 178 of this subchapter applicable to that standard; and**
- (iii) The competent authority of the country of manufacture provides reciprocal treatment for UN standard packagings manufactured in the U.S.**

This requirement applies to DOT-7A, Type A packagings manufactured outside the U.S. Indicate below if the requirement does or does not apply. If applicable, indicate below the form of documentation and where the documentation can be found.

☒ [ X] This requirement does not apply. The DOT-7A, Type A packaging being used was manufactured in the U.S.

☐ [ ] This requirement applies as the packaging being used was manufactured outside the U.S.

Documentation of the packaging's ability to meet the more severe requirements of 49 CFR 173, Subpart I, can be used to document compliance.

Addressed in:	<input type="checkbox"/> [ ] Drawing	<input type="checkbox"/> [ ] Operating Instruction
	<input type="checkbox"/> [ ] Specification	<input type="checkbox"/> [ ] Manufacturer Supplied Data
	<input type="checkbox"/> [ ] Analysis Report	<input type="checkbox"/> [ ] Similarity or Documented Record

Specify:

***This requirement is not applicable.***

**173.24(e) Compatibility.**

**(e) Compatibility.**

**(1) Even though certain packagings are specified in this part, it is, nevertheless, the responsibility of the person offering a hazardous material for transportation to ensure that such packagings are compatible with their lading. This particularly applies to corrosivity, permeability, softening, premature aging and embrittlement.**

This requirement applies to DOT-7A, Type A packagings. Indicate below the type of documentation that shows the lading is compatible with the packaging and identify where the documentation can be found.

Addressed in:	<input checked="" type="checkbox"/> Drawing	<input type="checkbox"/> Operating Instruction
	<input checked="" type="checkbox"/> Specification	<input type="checkbox"/> Manufacturer Supplied Data
	<input checked="" type="checkbox"/> Analysis Report	<input type="checkbox"/> Similarity or Documented Record

Specify:

*It is the shipper's responsibility to ensure that design requirements have been properly addressed by the designer and fabricator, such as welding being performed in a workmanlike manner; using suitable and appropriate techniques, materials, and equipment. The packaging materials, design, and arrangement of these materials are such that the intent of this requirement is met. The approved SWB configurations tested and evaluated by Mound and under Dockets 89-07-7A, 98-45-7A, and 01-53-7A are as identified in Section 4.1, Page A-10. The user has the responsibility to assure compliance with the DOT-7A Type A requirements for the characterization of contents at the time of shipment.*

**173.24(e) Compatibility.** (continued)

**(2) Packaging materials and contents must be such that there will be no significant chemical or galvanic reaction between the materials and contents of the package.**

This requirement applies to DOT-7A, Type A packagings. Indicate below the type of documentation that shows there will be no significant chemical or galvanic reactions and where the documentation can be found.

Addressed in:	<input checked="" type="checkbox"/> Drawing	<input type="checkbox"/> Operating Instruction
	<input checked="" type="checkbox"/> Specification	<input type="checkbox"/> Manufacturer Supplied Data
	<input checked="" type="checkbox"/> Analysis Report	<input type="checkbox"/> Similarity or Documented Record

Specify:

*It is the shipper's responsibility to ensure that design requirements have been properly addressed by the designer and fabricator, such as welding being performed in a workmanlike manner; using suitable and appropriate techniques, materials, and equipment. The packaging materials, design, and arrangement of these materials are such that the intent of this requirement is met. The approved SWB configurations tested and evaluated by Mound and under Dockets 89-07-7A, 98-45-7A, and 01-53-7A are as identified in Section 4.1, Page A-10. The user has the responsibility to assure compliance with the DOT-7A Type A requirements for the characterization of contents at the time of shipment.*

**173.24(e) Compatibility.** (continued)**(3) Plastic packagings and receptacles.**

(i) Plastic used in packagings and receptacles must be of a type compatible with the lading and may not be permeable to an extent that a hazardous condition is likely to occur during transportation, handling or refilling.

(ii) Each plastic packaging or receptacle that is used for liquid hazardous materials must be capable of withstanding without failure the procedure specified in appendix B of this part ("Procedure for Testing Chemical Compatibility and Rate Permeation in Plastic Packagings and Receptacles"). The procedure specified in appendix B of this part must be performed on each plastic packaging or receptacle used for Packing Group I materials. The maximum rate of permeation of hazardous lading through or into the plastic packaging or receptacles may not exceed 0.5 percent for the materials meeting the definition of a Division 6.1 material according to §173.132 and 2.0 percent for other hazardous materials, when subjected to a temperature no lower than—

(A) 18 °C (64 °F) for 180 days in accordance with Test Method 1 in appendix B of this part;

(B) 50 °C (122 °F) for 28 days in accordance with Test Method 2 in appendix B of this part; or

(C) 60 °C (140 °F) for 14 days in accordance with Test Method 3 in appendix B of this part.

(iii) Alternate procedures or rates of permeation are permitted if they yield a level of safety equivalent to or greater than that provided by paragraph (e)(3)(ii) or this section and are specifically approved by the Associate Administrator for Hazardous Materials Safety.

This requirement applies to DOT-7A, Type A packagings that use plastic containers to retain the load. Otherwise, the requirement does not apply. Remember to consider secondary hazards. Based on the materials of construction used for holding the load, indicate below if the requirement applies or does not apply. If the requirement applies, identify the documentation that shows compliance and identify where the documentation can be found.

This requirement:      ☒ Does not apply.      ☐ Applies; indicate the following.

Addressed in:      ☐ Drawing      ☐ Operating Instruction  
                          ☐ Specification      ☐ Manufacturer Supplied Data  
                          ☐ Analysis Report      ☐ Similarity or Documented Record

Specify:

***Plastic is not a component of the SWB design. Liquids are not authorized for use within the SWB.***

**173.24(e) Compatibility.** (continued)

**(4) Mixed contents.** Hazardous materials may not be packed or mixed together in the same outer packaging with other hazardous or nonhazardous materials if such materials are capable of reacting dangerously with each other and causing--

- (i) Combustion or dangerous evolution of heat;
- (ii) Evolution of flammable, poisonous, or asphyxiant gases; or
- (iii) Formation of unstable or corrosive materials.

**(5) Packagings used for solids, which may become liquid at temperatures likely to be encountered during transportation, must be capable of containing the hazardous material in the liquid state.**

These requirements are applicable to DOT-7A, Type A packagings. The requirements are load dependent. The primary hazards in a DOT-7A, Type A packaging are not likely to result in the identified hazards. However, secondary hazards are commonly associated with the radioactivity and should be watched for the potential to produce the identified conditions. The potential for a phase change exists with radioactive materials. An evaluation of the potential for a phase change should be made and documented. Indicate below if the requirements apply or do not apply. If the requirements apply, identify the type documentation used to show compliance and where the documentation can be found.

These requirements:	<input type="checkbox"/> Do not apply.	<input checked="" type="checkbox"/> Apply; indicate the following.
Addressed in:	<input type="checkbox"/> Drawing	<input type="checkbox"/> Operating Instruction
	<input type="checkbox"/> Specification	<input type="checkbox"/> Manufacturer Supplied Data
	<input type="checkbox"/> Analysis Report	<input checked="" type="checkbox"/> Similarity or Documented Record

Specify:

***The SWB packaging is not authorized for use with liquids. The shipper is responsible to ensure that materials will not be packed or mixed together so as to cause a reaction.***

**173.24(f) Closures.****(f) Closures.**

(1) Closures on packagings shall be so designed and closed that under conditions (including the effects of temperature and vibration) normally incident to transportation--

(i) Except as provided in paragraph (g) of this section, there is no identifiable release of hazardous materials to the environment from the opening to which the closure is applied; and

(ii) The closure is secure and leakproof.

(2) Except as otherwise provided in this subchapter, a closure (including gaskets or other closure components, if any) used on a specification packaging must conform to all applicable requirements of the specification.

These requirements apply to DOT-7A, Type A packagings. Indicate below the type of documentation that shows the requirements are met and where the documentation can be found.

Addressed in:	<input checked="" type="checkbox"/> Drawing	<input type="checkbox"/> Operating Instruction
	<input checked="" type="checkbox"/> Specification	<input type="checkbox"/> Manufacturer Supplied Data
	<input checked="" type="checkbox"/> Analysis Report	<input type="checkbox"/> Similarity or Documented Record

Specify:

*The DOT-7A Type A testing and evaluation activities for this packaging are recorded under Mound documentation, and under Dockets 89-07-7A, 98-45-7A, and 01-53-7A. The information on the SWB designs may be found in the supporting documentation identified in Section 4.1, Page A-10. Evaluation of the approved SWB designs under Docket 01-53-7A includes the following:*

- *Westinghouse Waste Isolation Division Drawing No. 165-F-001-W1, Revisions L and M.*
- *Westinghouse Waste Isolation Division Drawing No. 165-F-001-W2, Revisions B and C.*
- *Westinghouse Waste Isolation Division Drawing No. 165-F-001-W3, Revisions B and C.*
- *Specification E-I-343, Revision 4, "Specification for Fabrication of the Standard Waste Box."*

*Forty-two (42) rivets are provided within the body tube frame. The rivets meet ASTM A 576, Grade 1008, 1010, 1018, or 1110. Forty-two (42) ½-in. – 13 UNC x 1 ¼-in. socket flat head countersunk cap screws secure the lid to the container body. All lid screw threads are coated with a thread sealant and placed into position. All screws are torqued to 67.8 (-0,+13.56) N-m [50 ft-lbs (-0, +10)].*

*The gasket assembly is made from closed cell rubber and meets ASTM D 1056 (-40 °C to 100 °C [-40 °F to 212 °F]). Gasket miters are cut with a knife die and assembly and tolerances are provided on the noted drawing.*

*A total of four (4) filter mounting locations are provided. The packaging must be vented with a minimum of two (2) NucFil-013 filters. The two (2) remaining filter mounting locations must be plugged. The plugs and filters are installed by first applying thread sealant, and then inserting into the mounting locations and tightening to a final torque of 13.56 ± 6.78 N-m (10 ± 5 ft-lbs).*

*Based on materials of construction and design, and from previous evaluations by Mound and under Dockets 89-07-7A and 98-45-7A, the SWB designs under Docket 01-53-7A should not experience any negative impact because of the effects of temperature and vibration normally incident to transportation.*

**173.24(g) Venting.**

- (g) Venting of packagings, to reduce internal pressure which may develop by the evolution of gas from the contents, is permitted only when--
- (1) Transportation by aircraft is not involved;
  - (2) Except as otherwise provided in this subchapter, the evolved gases are not poisonous, likely to create a flammable mixture with air or be an asphyxiant under normal conditions of transportation;
  - (3) The packaging is designed so as to preclude an unintentional release of hazardous materials from the receptacle; and
  - (4) For shipments in bulk packagings, venting is authorized for the specific hazardous material by a special provision in the §172.101 table or by the applicable bulk packaging specification in part 178 of this subchapter.

These requirements apply to DOT-7A, Type A packagings that are vented. The requirements are not applicable to nonvented DOT-7A, Type A packagings. Based on the design, determine if the requirements apply or do not apply. If the requirements apply, indicate below the type of documentation that shows the requirements are met and where the documentation can be found.

These requirements:      ☐ Do not apply.      ☒ Apply; indicate the following.

Addressed in:              ☒ Drawing              ☒ Operating Instruction  
                                  ☒ Specification              ☐ Manufacturer Supplied Data  
                                  ☒ Analysis Report              ☒ Similarity or Documented Record

Specify:

1. *The SWB is vented and is not authorized for air transport.*
2. *It is the shipper's responsibility to ensure that the packaging is not used with materials that can result in the production of a flammable mixture or as an asphyxiant.*
3. *Forty-two (42) rivets are provided within the body tube frame. The rivets meet ASTM A 576, Grade 1008, 1010, 1018, or 1110. Forty-two (42) ½-in. – 13 UNC x 1 ¾-in. socket flat head countersunk cap screws secure the lid to the container body. All lid screw threads are coated with a thread sealant and placed into position. All screws are torqued to 67.8 (-0, + 13.56) N-m [50 ft-lbs (-0, +10)].*

*The gasket assembly is made from closed cell rubber and meets ASTM D 1056. Gasket miters are cut with a knife die and assembly and tolerances are provided on the noted drawing.*

*A total of four (4) filter mounting locations are provided. The packaging must be vented with a minimum of two (2) NucFil-013 filters. The two (2) remaining filter mounting locations must be plugged. The plugs and filters are installed by first applying thread sealant, and then inserting into the mounting locations and tightening to a final torque of 13.56 ± 6.78 N-m (10 ± 5 ft-lbs).*

4. *This packaging may be considered as a bulk packaging.*

**173.24(h) Outage and Filling Limits.**

**(h) Outage and filling limits—**

**(1) General.** When filling packagings and receptacles for liquids, sufficient ullage (outage) must be left to ensure that neither leakage nor permanent distortion of the packaging or receptacle will occur as a result of an expansion of the liquid caused by temperatures likely to be encountered during transportation. Requirements for outage and filling limits for non-bulk and bulk packagings are specified in §§173.24a(d) and 173.24b(a), respectively.

**(2) Compressed gases and cryogenic liquids.** Filling limits for compressed gases and cryogenic liquids are specified in §§173.301 through 173.306 for cylinders and §§173.314 through 173.319 for bulk packagings.

These requirements apply to DOT-7A, Type A packagings used for the shipment of liquids and gases. The requirements are not applicable to DOT-7A, Type A packagings used to ship solids. Based on the load, indicate if the requirements apply or do not apply. If the requirements apply, indicate below the type of documentation that shows the requirements are met and where the documentation can be found.

These requirements:      ☒ Do not apply.      ☐ Apply; indicate the following.

Addressed in:	<input type="checkbox"/> Drawing	<input type="checkbox"/> Operating Instruction
	<input type="checkbox"/> Specification	<input type="checkbox"/> Manufacturer Supplied Data
	<input type="checkbox"/> Analysis Report	<input type="checkbox"/> Similarity or Documented Record

Specify:

***The SWB is not authorized for shipment of liquids or gases.***

**173.24(i) Air Transportation.**

**(i) Air transportation. Packages offered or intended for transportation by aircraft must conform to the general requirements for transportation by aircraft in §173.27, except as provided in §171.11 of this subchapter.**

This requirement applies to DOT-7A, Type A packagings when used for transportation by aircraft. Otherwise, the requirement does not apply. Based on the mode of transportation, indicate if the requirement applies or does not apply. If the requirement applies, indicate below the type of documentation that shows the requirement is met and where the documentation can be found.

This requirement:	<input checked="" type="checkbox"/> Does not apply.	<input type="checkbox"/> Applies; indicate the following.
Addressed in:	<input type="checkbox"/> Drawing	<input type="checkbox"/> Operating Instruction
	<input type="checkbox"/> Specification	<input type="checkbox"/> Manufacturer Supplied Data
	<input type="checkbox"/> Analysis Report	<input type="checkbox"/> Similarity or Documented Record

Specify:

***The SWB is not authorized for air shipment.***



## 4.2 49 CFR 173.24A ADDITIONAL GENERAL REQUIREMENTS FOR NON-BULK PACKAGINGS AND PACKAGES.

**173.24a (a) Packaging design.** Except as provided in §172.312 of this subchapter:

**(1) Inner packaging closures.** A combination packaging containing liquid hazardous materials must be packed so that closures on inner packagings are upright.

This requirement applies to DOT-7A, Type A packagings that meet the definition of a combination packaging and are used to ship liquids. The requirement does not apply to packagings used to ship nonliquids. Based on the packaging type and load, indicate if the requirement applies or does not apply. If the requirement applies, indicate below the type of documentation that shows the requirement is met and where the documentation can be found.

This requirement:            ☒ Does not apply.            ☐ Applies; indicate the following.

Addressed in:            ☐ Drawing            ☐ Operating Instruction  
                               ☐ Specification            ☐ Manufacturer Supplied Data  
                               ☐ Analysis Report            ☐ Similarity or Documented Record

Specify:

***The SWB is a bulk packaging. The SWB is not a combination packaging. The SWB is not authorized for transporting liquid materials.***

**173.24a (a) Packaging Design.** (continued)

**(2) Friction.** The nature and thickness of the outer packaging must be such that friction during transportation is not likely to generate an amount of heat sufficient to alter dangerously the chemical stability of the contents.

This requirement applies to non-bulk DOT-7A, Type A packagings. Indicate below the type of documentation that shows this requirement is met and where the documentation can be found.

Addressed in:            ☒ Drawing            ☐ Operating Instruction  
                               ☒ Specification            ☐ Manufacturer Supplied Data  
                               ☒ Analysis Report            ☐ Similarity or Documented Record

Specify:

***The SWB is a bulk packaging for shipment of solid materials only. The container lid, sides, and bottom panels are made from 10 gauge hot rolled sheet steel to meet ASTM A 569 or ASTM A 570, Grade 30 (minimum). The nature and thickness of the SWB design is such that friction during transport will not generate any heat that would adversely affect the contents.***

**173.24a (a) Packaging Design.** (continued)

**(3) Securing and cushioning.** Inner packagings of combination packagings must be so packed, secured and cushioned to prevent their breakage or leakage and to control their movement within the outer packaging under conditions normally incident to transportation. Cushioning material must not be capable of reacting dangerously with the contents of the inner packagings.

This requirement applies to DOT-7A, Type A packagings that meet the definition of a combination packaging. The requirement does not apply to non-combination packagings. Based on the packaging type, indicate if the requirement applies or does not apply. If the requirement applies, indicate below the type of documentation that shows the requirement is met and where the documentation can be found.

This requirement:      ☒ Does not apply.      ☐ Applies; indicate the following.

Addressed in:            ☐ Drawing                              ☐ Operating Instruction  
                               ☐ Specification                        ☐ Manufacturer Supplied Data  
                               ☐ Analysis Report                      ☐ Similarity or Documented Record

Specify:

*The SWB is a bulk packaging. The SWB is not a combination packaging. For heavy, bulky materials (e.g., chunks, motors, and pumps), equipment or materials with sharp corners or protrusions, or material/equipment geometries that could result in highly localized forces, the shipper must ensure that the contents are securely fastened/positioned within the package.*

**173.24a (a) Packaging Design.** (continued)

**(4) Metallic devices.** Nails, staples and other metallic devices shall not protrude into the interior of the outer packaging in such a manner as to be likely to damage inner packagings or receptacles.

This requirement applies to DOT-7A, Type A packagings that use devices that could protrude into the interior of the outer packaging. Based on the packaging design, indicate if the requirement applies or does not apply. If the requirement applies, indicate below the type of documentation that shows the requirement is met and where the documentation can be found.

This requirement:      ☒ Does not apply.      ☐ Applies; indicate the following.

Addressed in:            ☐ Drawing                              ☐ Operating Instruction  
                               ☐ Specification                        ☐ Manufacturer Supplied Data  
                               ☐ Analysis Report                      ☐ Similarity or Documented Record

Specify:

*The SWB is a bulk packaging. The SWB is not a combination packaging. The SWB does not have any metallic protrusions that are incorporated into the design of the packaging.*

*It is the shipper's responsibility to ensure this requirement is met, if applicable.*

**173.24a (a) Packaging Design.** (continued)

**(5) Vibration.** Each non-bulk package must be capable of withstanding, without rupture or leakage, the vibration test procedure specified in §178.608 of this subchapter.

This requirement applies to non-bulk DOT-7A, Type A packagings. Indicate below the type of documentation that shows this requirement is met and where the documentation can be found.

Addressed in:	<input checked="" type="checkbox"/> Drawing	<input type="checkbox"/> Operating Instruction
	<input checked="" type="checkbox"/> Specification	<input type="checkbox"/> Manufacturer Supplied Data
	<input checked="" type="checkbox"/> Analysis Report	<input type="checkbox"/> Similarity or Documented Record

Specify:

*The SWB is a bulk packaging.*

*The vibration test procedure specified in §178.608 was not performed on the SWB as a Type A packaging.*

*The DOT-7A Type A testing and evaluation activities for this packaging are recorded under Mound documentation, and under Dockets 89-07-7A, 98-45-7A, and 01-53-7A. The information on the SWB designs may be found in the supporting documentation identified in Section 4.1, Page A-10. Evaluation of the approved SWB designs under Docket 01-53-7A includes the following:*

- *Westinghouse Waste Isolation Division Drawing No. 165-F-001-W1, Revisions L and M.*
- *Westinghouse Waste Isolation Division Drawing No. 165-F-001-W2, Revisions B and C.*
- *Westinghouse Waste Isolation Division Drawing No. 165-F-001-W3, Revisions B and C.*
- *Specification E-I-343, Revision 4, "Specification for Fabrication of the Standard Waste Box."*

*Forty-two (42) rivets are provided within the body tube frame. The rivets meet ASTM A 576, Grade 1008, 1010, 1018, or 1110. Forty-two (42) ½-in. – 13 UNC x 1 ¼-in. socket flat head countersunk cap screws secure the lid to the container body. All lid screw threads are coated with a thread sealant and placed into position. All screws are torqued to 67.8 (-0, + 13.56) N-m [50 ft-lbs (-0, +10)].*

*The gasket assembly is made from closed cell rubber and meets ASTM D 1056. Gasket miters are cut with a knife die and assembly and tolerances are provided on the noted drawing.*

*A total of four (4) filter mounting locations are provided. The packaging must be vented with a minimum of two (2) NucFil-013 filters. The two (2) remaining filter mounting locations must be plugged. The plugs and filters are installed by first applying thread sealant, and then inserting into the mounting locations and tightening to a final torque of 13.56 ±6.78 N-m (10 ±5 ft-lbs).*

*The purpose of this requirement is to prevent the loosening of nuts, bolts, and containment devices under conditions incident to routine transportation. The shipper must ensure the application of quality assurance necessary to achieve this requirement.*

*Based on materials of construction and design, and from previous evaluations by Mound and under Dockets 89-07-7A and 98-45-7A, the SWB designs under Docket 01-53-7A should not experience any negative impact because of the effects of temperature and vibration normally incident to transportation.*

**173.24a (b) Non-bulk Packaging Filling Limits.**

- (1) A single or composite non-bulk packaging may be filled with a liquid hazardous material only when the specific gravity of the material does not exceed that marked on the packaging, or a specific gravity of 1.2 if not marked, except as follows:
  - (i) A Packing Group I packaging may be used for a Packing Group II material with a specific gravity not exceeding the greater of 1.8, or 1.5 times the specific gravity marked on the packaging, provided all the performance criteria can still be met with the higher specific gravity material;
  - (ii) A Packing Group I packaging may be used for a Packing Group III material with a specific gravity not exceeding the greater of 2.7, or 2.25 times the specific gravity marked on the packaging, provided all the performance criteria can still be met with the higher specific gravity material; and
  - (iii) A Packing Group II packaging may be used for a packing Group III material with a specific gravity not exceeding the greater of 1.8, or 1.5 times the specific gravity marked on the packaging, provided all the performance criteria can still be met with the higher specific gravity material.
- (2) Except as otherwise provided in this section, a single or composite non-bulk packaging may not be filled with a solid hazardous material to a gross mass greater than the maximum gross mass marked on the packaging.
- (3) A single or composite non-bulk packaging which is tested or marked for liquid hazardous materials may be filled with a solid hazardous material to a gross mass, in kilograms, not exceeding the rated capacity of the packaging in liters, multiplied by the specific gravity marked on the packaging, or 1.2 if not marked. In addition:
  - (i) A single or composite non-bulk packaging which is tested and marked for Packing Group I liquid hazardous materials may be filled with a solid Packing Group II hazardous material to a gross mass, in kilograms, not exceeding the rated capacity of the packaging in liters, multiplied by 1.5, multiplied by the specific gravity marked on the packaging, or 1.2 if not marked.
  - (ii) A single or composite non-bulk packaging which is tested and marked for Packing Group I liquid hazardous materials may be filled with a solid Packing Group III hazardous material to a gross mass, in kilograms, not exceeding the rated capacity of the packaging in liters, multiplied by 2.25, multiplied by the specific gravity marked on the packaging, or 1.2 if not marked.
  - (iii) A single or composite non-bulk packaging which is tested and marked for Packing Group II liquid hazardous materials may be filled with a solid Packing Group III hazardous material to a gross mass, in kilograms, not exceeding the rated capacity of the packaging in liters, multiplied by 1.5, multiplied by the specific gravity marked on the packaging, or 1.2 if not marked.
- (4) Packagings tested as prescribed in §178.605 of this subchapter and marked with the hydrostatic test pressure as prescribed in §178.503(a)(5) of this subchapter may be used for liquids only when the vapor pressure of the liquid conforms to one of the following:
  - (i) The vapor pressure must be such that the total pressure in the packaging [i.e., the vapor pressure of the liquid plus the partial pressure of air or other inert gases], less 100 kPa (15 psi) at 55° C (131° F) [determined on the basis of a maximum degree of filling in accordance with paragraph (d) of this section and a filling temperature of 15° C (59 °F)], will not exceed two-thirds of the marked test pressure;

**173.24a(b)(4) Non-bulk Packaging Filling Limits.** (continued)

- (ii) The vapor pressure at 50° C (122° F) must be less than four-sevenths of the sum of the marked test pressure plus 100 kPa (15 psi); or
- (iii) The vapor pressure at 55° C (131° F) must be less than two-thirds of the sum of the marked test pressure plus 100 kPa (15 psi).

*These requirements are not applicable to DOT-7A, Type A packagings.*

1. *DOT-7A, Type A packagings do not incorporate Packing Groups.*
2. *The maximum gross weight is not required to be marked on DOT-7A, Type A packagings by the manufacturer.*
3. *Packing Groups are not applicable to radioactive material.*
4. *49 CFR 178.605 does not pertain to specification packagings.*

*In addition, this is a bulk packaging that has been tested and evaluated for transport of solid materials only.*

**173.24a (b) Non-bulk Packaging Filling Limits.**

- (5) No hazardous material may remain on the outside of a package after filling.

*For DOT-7A, Type A packagings, the requirements of 49 CFR 173.443 override this requirement. That section requires radioactive contamination on the surface of the package to be as low as reasonably achievable and establishes an upper limit for the contamination.*

**173.24a (c) Mixed Contents.**

(1) An outer non-bulk packaging may contain more than one hazardous material only when--

- (i) The inner and outer packagings used for each hazardous material conform to the relevant packaging sections of this part applicable to that hazardous material;
- (ii) The package as prepared for shipment meets the performance tests prescribed in part 178 of this subchapter for the packing group indicating the highest order of hazard for the hazardous materials contained in the package;
- (iii) Corrosive materials (except ORM-D) in bottles are further packed in securely closed inner receptacles before packing in outer packagings; and
- (iv) For transportation by aircraft, the total net quantity does not exceed the lowest permitted maximum net quantity per package as shown in Column 9a or 9b, as appropriate, of the §172.101 table. The permitted maximum net quantity must be calculated in kilograms if a package contains both a liquid and a solid.

Note this requirement only applies if the package is to carry both radioactive and nonradioactive hazardous materials. Based on the load, indicate if the requirement applies or does not apply. If the requirement applies, indicate below the type of documentation that shows the requirement is met and where the documentation can be found.

This requirement:            ☒ Does not apply.            ☐ Applies; indicate the following.

Addressed in:                ☐ Drawing                                ☐ Operating Instruction  
                                  ☐ Specification                        ☐ Manufacturer Supplied Data  
                                  ☐ Analysis Report                       ☐ Similarity or Documented Record

Specify:

***The SWB is a bulk packaging to be used in the transport of solid materials only. The SWB is not a combination packaging. Air transport is not authorized. It is the shipper's responsibility to ensure that reactive hazardous components are not shipped together in the packaging.***

**173.24a (c) Mixed Contents.** (continued)

(2) A packaging containing inner packagings of Division 6.2 materials may not contain other hazardous materials, except dry ice.

***This requirement does not apply to DOT-7A, Type A packagings. The Class 7 packaging requirements will determine the packaging that applies.***

**173.24a (d) Liquid Fill Level.**

**(d) Liquids must not completely fill a receptacle at a temperature of 55 °C (131 °F) or less.**

This requirement applies to DOT-7A, Type A packagings. Based on the load, indicate if the requirement applies or does not apply. If the requirement applies, indicate below the type of documentation that shows the requirement is met and where the documentation can be found.

This requirement:            ☒ Does not apply.            ☐ Applies; indicate the following.

Addressed in:                ☐ Drawing                                ☐ Operating Instruction  
                                 ☐ Specification                        ☐ Manufacturer Supplied Data  
                                 ☐ Analysis Report                       ☐ Similarity or Documented Record

Specify:

***The SWB is not authorized for transport of liquid contents.***

### 4.3 49 CFR 173.24B ADDITIONAL GENERAL REQUIREMENTS FOR BULK PACKAGINGS.

#### 173.24b(a) Outage and Filling Limits.

- (1) Except as otherwise provided in this subchapter, liquids and liquified gases must be so loaded that the outage is at least five percent for materials poisonous by inhalation, or at least one percent of the total capacity of a cargo tank, portable tank, tank car (including dome capacity), multi-unit tank car tank, or any compartment thereof, at the following reference temperatures—
  - (i) 46°C (115°F) for a noninsulated tank;
  - (ii) 43°C (110°F) for a tank car having a thermal protection system, incorporating a metal jacket that provides an overall thermal conductance at 15.5 °C (60 °F) of no more than 10.22 kilojoules per hour per square meter per degree Celsius (0.5 Btu per hour/per square foot/per degree F) temperature differential; or
  - (iii) 41°C (105°F) for an insulated tank.
- (2) Hazardous materials may not be loaded into the dome of a tank car. If the dome of a tank car does not provide sufficient outage, vacant space must be left in the shell to provide the required outage.

These requirements are not applicable to a DOT-7A, Type A packaging unless it also meets the definition of a cargo tank; portable tank; tank car; or multi-unit tank car tank, or any compartment thereof, and is used to haul the identified liquids. Based on the packaging design, indicate if the requirements apply or do not apply. If the requirements apply, indicate below the type of documentation that shows the requirements are met and where the documentation can be found.

These requirements:      ☒ Do not apply.      ☐ Apply; indicate the following.

Addressed in:              ☐ Drawing                      ☐ Operating Instruction  
                                  ☐ Specification                ☐ Manufacturer Supplied Data  
                                  ☐ Analysis Report              ☐ Similarity or Documented Record

Specify:

*The SWB may be considered as a bulk packaging. Liquids and gases are not authorized for transport in the SWB. The shipper is responsible for assuring these requirements are met, if applicable.*



**173.24b (b) Stainless Steel Substitution.**

(b) *Equivalent steel.* For the purposes of this section, stainless steel is steel with a guaranteed minimum tensile strength of 51.7 deka newtons per square millimeter (75,000 psi) and a guaranteed elongation of 40 percent or greater. Where the regulations permit steel other than stainless steel to be used in place of a specified stainless steel (for example, as in §172.102 of this subchapter, special provision B30), the minimum thickness for the steel must be obtained from one of the following formulas, as appropriate:

**Formula for metric units:**

$$e_1 = (12.74e_0) / (Rm_1 A_1)^{1/3}$$

**Formula for non-metric units:**

$$e_1 = (144.2e_0) / (Rm_1 A_1)^{1/3}$$

**Where:**

$e_0$  = Required thickness of the reference stainless steel in millimeters or inches respectively;

$e_1$  = Equivalent thickness of the steel used in millimeters or inches respectively;

$Rm_1$  = Specified minimum tensile strength of the steel used in deka newtons per square millimeter or pounds per square inch respectively; and

$A_1$  = Specified minimum percentage elongation of the steel used multiplied by 100 (for example, 20 percent times 100 equals 20). Elongation values used must be determined from a 50 mm or 2-inch test specimen.

*This requirement is not applicable to DOT-7A, Type A packagings as no specific materials of construction are identified for the packaging.*

*The SWB is made from 10 gauge, hot-rolled, carbon steel that meets the requirements of ASTM A 569 or ASTM A 570, Grade 30 (minimum).*

**173.24b (c) Pressurized Loading:**

**(c) Air pressure in excess of ambient atmospheric pressure may not be used to load or unload any lading that may create an air-enriched mixture within the flammability range of the lading in the vapor space of the tank.**

This requirement applies to DOT-7A, Type A packagings that meet the definition of bulk packaging. Based on the packaging design and load, indicate if the requirement applies or does not apply. If the requirement applies, indicate below the type of documentation that shows the requirement is met and where the documentation can be found.

This requirement:      ☒ Does not apply.      ☐ Applies; indicate the following.

Addressed in:            ☐ Drawing                      ☐ Operating Instruction  
                               ☐ Specification                ☐ Manufacturer Supplied Data  
                               ☐ Analysis Report            ☐ Similarity or Documented Record

Specify:

***This is a bulk packaging. Air pressure is not used to load or unload the lading.***

**173.24b (d) Design Temperature Range/Weight:**

**(d) A bulk packaging may not be loaded with a hazardous material that:**  
       **(1) Is at a temperature outside of the packaging's design temperature range; or**  
       **(2) Except as otherwise provided in this subchapter, exceeds the maximum weight of lading marked on the specification plate.**

This requirement applies to a DOT-7A, Type A packaging that also meets the definition of a bulk packaging. Based on the packaging design, indicate if the requirement applies or does not apply. If the requirement applies, indicate below the type of documentation that shows the requirement is met and where the documentation can be found.

This requirement:      ☒ Does not apply.      ☐ Applies; indicate the following.

Addressed in:            ☐ Drawing                      ☐ Operating Instruction  
                               ☐ Specification                ☐ Manufacturer Supplied Data  
                               ☐ Analysis Report            ☐ Similarity or Documented Record

Specify:

***This is a bulk packaging that is being tested and evaluated to qualify as a DOT-7A Type A packaging. There is no required specification plate.***

#### 4.4 49 CFR 173.27 GENERAL REQUIREMENTS FOR TRANSPORTATION BY AIRCRAFT.

##### 173.27(a) Transport by Aircraft.

(a) The requirements of this section are in addition to the requirements in §173.24 and apply to packages offered or intended for transportation aboard aircraft. Notwithstanding any Packing Group III performance level specified in Column 5 of the §172.101 table, the required performance level for packages containing Class 4, 5, or 8 materials, when offered or intended for transportation aboard aircraft, is at the Packing Group II performance level, unless otherwise excepted from performance requirements in Subpart E of this part.

This requirement is applicable to DOT-7A, Type A packagings when transported by aircraft. Based on the mode of transportation, indicate if the requirement applies or does not apply. If the requirement applies, indicate below the type of documentation that shows the requirement is met and where the documentation can be found.

This requirement:	<input checked="" type="checkbox"/> Does not apply.	<input type="checkbox"/> Applies; indicate the following.
Addressed in:	<input type="checkbox"/> Drawing	<input type="checkbox"/> Operating Instruction
	<input type="checkbox"/> Specification	<input type="checkbox"/> Manufacturer Supplied Data
	<input type="checkbox"/> Analysis Report	<input type="checkbox"/> Similarity or Documented Record

Specify:

***The SWB is not authorized for transport by aircraft.***

**173.27(b) Transport by Aircraft.**

**(b) Packages authorized on board aircraft.**

- (1) When Column 9a of the §172.101 table indicates that a material is "Forbidden", that material may not be offered for transportation or transported aboard passenger-carrying aircraft.**
- (2) When Column 9b of the §172.101 table indicates that a material is "Forbidden", that material may not be offered for transportation or transported aboard aircraft.**
- (3) The maximum quantity of hazardous material in a package that may be offered for transportation or transported aboard a passenger-carrying aircraft or cargo aircraft may not exceed that quantity prescribed for the material in Column 9a or 9b, respectively, of the §172.101 table.**
- (4) A package containing a hazardous material which is authorized aboard cargo aircraft but not aboard passenger aircraft must be labeled with the CARGO AIRCRAFT ONLY label required by §172.402(b) of this subchapter and may not be offered for transportation or transported aboard passenger-carrying aircraft.**

These requirements are applicable to DOT-7A, Type A packagings when transported by aircraft. Based on the mode of transportation, indicate if the requirements apply or do not apply. If the requirements apply, indicate below the type of documentation that shows the requirements are met and where the documentation can be found.

This requirement:	<input checked="" type="checkbox"/> Does not apply.	<input type="checkbox"/> Applies; indicate the following.
Addressed in:	<input type="checkbox"/> Drawing	<input type="checkbox"/> Operating Instruction
	<input type="checkbox"/> Specification	<input type="checkbox"/> Manufacturer Supplied Data
	<input type="checkbox"/> Analysis Report	<input type="checkbox"/> Similarity or Documented Record

Specify:

***The SWB is not authorized for transport by aircraft.***

**173.27(c) Transport by Aircraft.**

**(c) Pressure requirements. (1) Packagings must be designed and constructed to prevent leakage that may be caused by changes in altitude and temperature during transportation aboard aircraft.**

This requirement is applicable to DOT-7A, Type A packagings when transported by aircraft. Based on the mode of transportation, indicate if the requirement applies or does not apply. If the requirement applies, indicate below the type of documentation that shows the requirement is met and where the documentation can be found.

This requirement:      ☒ Does not apply.      ☐ Applies; indicate the following.

Addressed in:              ☐ Drawing                      ☐ Operating Instruction  
                                  ☐ Specification                ☐ Manufacturer Supplied Data  
                                  ☐ Analysis Report              ☐ Similarity or Documented Record

Specify:

***The SWB is not authorized for transport by aircraft.***

**173.27(c) Transport by Aircraft.** (continued)

**(2) Packagings for which retention of liquid is a basic function must be capable of withstanding without leakage the greater of--**

- (i) An internal pressure which produces a gauge pressure of not less than 75 kPa (11 psi) for liquids in Packing Group III of Class 3 or Division 6.1 or 95 kPa (14 psi) for other liquids; or**
- (ii) A pressure related to the vapor pressure of the liquid to be conveyed, determined by one of the following:**
  - (A) The total gauge pressure measured in the receptacle [i.e., the vapor pressure of the material and the partial pressure of air or other inert gases, less 100 kPa (15 psi) at 55°C (131°F)], multiplied by a safety factor of 1.5; determined on the basis of a filling temperature of 15°C (59 °F) and a degree of filling such that the receptacle is not completely liquid full at a temperature of 55°C (131°F) or less;**
  - (B) 1.75 times the vapor pressure at 50°C (122°F) less 100 kPa (15 psi); or**
  - (C) 1.5 times the vapor pressure at 55°C (131°) less 100 kPa (15 psi).**

This requirement is applicable to a DOT-7A, Type A packaging when it is transported by aircraft and contains liquids. Based on the mode of transportation and content, indicate below if the requirement applies or does not apply. If the requirement applies, indicate the type of documentation that shows the requirement is met and where the documentation can be found.

This requirement:	<input checked="" type="checkbox"/> Does not apply.	<input type="checkbox"/> Applies; indicate the following.
Addressed in:	<input type="checkbox"/> Drawing <input type="checkbox"/> Specification <input type="checkbox"/> Analysis Report	<input type="checkbox"/> Operating Instruction <input type="checkbox"/> Manufacturer Supplied Data <input type="checkbox"/> Similarity or Documented Record

Specify:

***The SWB is not authorized for transport by aircraft.***

**173.27(c) Transport by Aircraft.** (continued)

- (3) Notwithstanding the provisions of paragraph (c)(2) of this section--
- (i) Hazardous materials may be contained in an inner packaging which does not itself meet the pressure requirement provided that the inner packaging is packed within a supplementary packaging which does meet the pressure requirement and other applicable packaging requirements of this subchapter.
  - (ii) Packagings which are subject to the hydrostatic pressure test and marking requirements of §178.605 and §178.503(a)(5), respectively, of this subchapter must have a marked test pressure of not less than 250 kPa (36 psi) for liquids in Packing Group I, 80 kPa (12 psi) for liquids in Packing Group III of Class 3 or Division 6.1, and 100 kPa (15 psi) for other liquids.

*These requirements are not applicable to DOT-7A, Type A packagings.*

*The first part of this requirement clarifies that the packaging holding the load does not have to provide the pressure boundary. The second part is not applicable to DOT-7A, Type A packagings as these types of packagings are not subject to §§ 49 CFR 178.605 or 178.503(a)(5) of the regulations.*

*In addition, the SWB is not authorized for transport by aircraft.*

**173.27(d) Transport by Aircraft.**

(d) Closures. Stoppers, corks or other such friction-type closures must be held securely, tightly and effectively in place by positive means. Each screw-type closure on any packaging must be secured to prevent closure from loosening due to vibration or substantial change in temperature.

This requirement is applicable to DOT-7A, Type A packagings when transported by aircraft. Based on the mode of transportation, indicate below if the requirement applies or does not apply. If the requirement applies, indicate the type of documentation that shows the requirement is met and where the documentation can be found.

This requirement:      ☒ Does not apply.      ☐ Applies; indicate the following.

Addressed in:      ☐ Drawing      ☐ Operating Instruction  
                          ☐ Specification      ☐ Manufacturer Supplied Data  
                          ☐ Analysis Report      ☐ Similarity or Documented Record

Specify:

*The SWB is not authorized for transport by aircraft.*

**173.27(e) Transport by Aircraft.**

(e) Absorbent materials. Except as otherwise provided in this subchapter, liquids in Packing Group I or II of Class 3, 4, 5, 6, or 8, when in glass or earthenware inner packagings, must be packaged using material capable of absorbing and not likely to react dangerously with the liquid. Absorbent material is not required if the inner packagings are so protected that breakage of them and leakage of their contents from the outer packaging is not likely to occur under normal conditions of transportation and is not required for packagings containing liquids in Packing Group II for transport aboard cargo aircraft only. Where absorbent material is required and an outer packaging is not liquid-tight, a means of containing the liquid in the event of leakage must be used in the form of a leakproof liner, plastic bag or other equally efficient means of containment. Where absorbent material is required, the quantity and disposition of it in each outer packaging must be as follows:

- (1) For packagings containing liquids in Packing Group I offered for transportation or transported aboard passenger-carrying aircraft, each packaging must contain sufficient absorbent material to absorb the contents of all inner packagings containing such liquids;
- (2) For packagings containing liquids in Packing Group I offered for transportation or transported aboard cargo aircraft only and packagings containing liquids in Packing Group II offered for transportation or transported aboard passenger aircraft, each package must contain sufficient absorbent material to absorb the contents of any one of the inner packagings containing such liquids and, where they are of different sizes and quantities, sufficient absorbent material to absorb the contents of the inner packaging containing the greatest quantity of liquid.

*These requirements are not applicable to DOT-7A, Type A packagings.*

*DOT-7A, Type A packagings are for transport of Class 7 (radioactive) materials.*

*In addition, the SWB is not authorized for transport by aircraft.*

**173.27(f) Transport by Aircraft.**

(f) Combination packagings. Unless otherwise specified in this part, or in §171.11 of this subchapter, when combination packagings are offered for transportation aboard aircraft, inner packagings must conform to the quantity limitations set forth in Table 1 of this paragraph for transport aboard passenger-carrying aircraft and Table 2 of this paragraph for transport aboard cargo aircraft only, as follows: ...

*These requirements are not applicable to DOT-7A, Type A packagings.*

*DOT-7A, Type A packagings are for transport of Class 7 (radioactive) materials.*

*In addition, the SWB is not authorized for transport by aircraft.*



**173.27(g) Transport by Aircraft.**

(g) Cylinders. For any cylinder containing hazardous materials and incorporating valves, sufficient protection must be provided to prevent operation of, and damage to, the valves during transportation, by one of the following methods:

- (1) By equipping each cylinder with securely attached valve caps or protective head rings; or
- (2) By boxing or crating the cylinder.

This requirement is not applicable to a DOT-7A, Type A packaging unless it is a cylinder equipped with a valve(s) and is to be transported by aircraft. Based on the mode of transportation and packaging type, indicate below if the requirement applies or does not apply. If the requirement applies, indicate below the type of documentation that shows the requirement is met and where the documentation can be found.

This requirement:            ☒ Does not apply.            ☐ Applies; indicate the following.

Addressed in:                ☐ Drawing                                ☐ Operating Instruction  
                                  ☐ Specification                            ☐ Manufacturer Supplied Data  
                                  ☐ Analysis Report                        ☐ Similarity or Documented Record

Specify:

***The SWB is not authorized for transport by aircraft. In addition, the SWB is not a cylindrical package, nor does the packaging incorporate any valves.***

**173.27(h) Transport by Aircraft.**

(h) Tank cars and cargo tanks. Any tank car or cargo tank containing a hazardous material may not be transported aboard aircraft.

This requirement is not applicable to a DOT-7A, Type A packaging unless it is a tank car or cargo tank and is to be transported by aircraft. Based on the mode of transportation and packaging type, indicate below if the requirement applies or does not apply. If the requirement applies, indicate below the type of documentation that shows the requirement is met and where the documentation can be found.

This requirement:            ☒ Does not apply.            ☐ Applies; indicate the following.

Addressed in:                ☐ Drawing                                ☐ Operating Instruction  
                                  ☐ Specification                            ☐ Manufacturer Supplied Data  
                                  ☐ Analysis Report                        ☐ Similarity or Documented Record

Specify:

***The SWB is not authorized for transport by aircraft. The SWB is not a tank car or cargo tank.***

**4.5 49 CFR 173.410 GENERAL DESIGN REQUIREMENTS.****173.410(a) Handling and Securing.**

**In addition to the requirements of subparts A and B of this part, each package used for the shipment of Class 7 (radioactive) materials must be designed so that—**

- (a) The package can be easily handled and properly secured in or on a conveyance during transport.**

This requirement applies to DOT-7A, Type A packagings. Indicate below the type of documentation that shows this requirement is met and where the documentation can be found.

Addressed in:	<input type="checkbox"/> Drawing	<input type="checkbox"/> Operating Instruction
	<input type="checkbox"/> Specification	<input type="checkbox"/> Manufacturer Supplied Data
	<input checked="" type="checkbox"/> Analysis Report	<input type="checkbox"/> Similarity or Documented Record

Specify:

*The SWB designs evaluated meets the intent of this requirement. The SWB is not intended for manual handling, and the packaging has a large, stable base. The maximum gross weight of the SWB is 1,814.37 kg (4,000 lb). Mound evaluated the SWB lifting clips and found that they exceed the required safety factor of three (3). [Tested with a gross weight over 9,071.85 kg (20,000 lb) for five minutes with no detectable effect.] An engineering analysis also demonstrated that failure of the lifting clips would not impair the ability of the package to meet all other requirements (i.e., the lifting clips will fail before the packaging). The SWB may be secured by blocking and bracing.*

*It should be noted that the lid lift nut that is located in the center of the lid is for lifting only the lid, not the entire package/packaging. An engineering analysis performed by Westinghouse Hanford Company (WHC) under Docket 89-07-7A focused on the acceptability of the incorporation of the lift point into the lid panel. The analysis showed that the lifting eye and/or lift point threads will fail prior to the lid panel failure. Additionally, the analysis showed that all containment boundaries will be equal to or greater than the lid panel thickness.*

*Under Docket 98-45-7A, Waste Management Federal Services Inc., Northwest Operations (WMNW) performed an evaluation for adding an option to place weld filler material on the inside of the lift clips instead of caulk. The purpose of the caulk or filler material is to seal against water and contamination. It was demonstrated that this change does not alter the results of the structural evaluation of lifting clips or affect the structural integrity of the SWB design.*

*Under Docket 01-53-7A, Duratek Federal Services Inc., Northwest Operations (DFSNW) performed an evaluation of the changes as identified within Table 1-1 of this final evaluation report. The majority of the changes were due to the reformatting of AWS D1.1 (2000), "Structural Welding Code—Steel." It was demonstrated that the changes identified within Table 1-1 would not alter the structural integrity of the SWB design.*

**173.410(b) Lifting Attachments.**

**(b) Each lifting attachment that is a structural part of the package must be designed with a minimum safety factor of three against yielding when used to lift the package in the intended manner, and it must be designed so that failure of any lifting attachment under excessive load would not impair the ability of the package to meet other requirements of this subpart. Any other structural part of the package which could be used to lift the package must be capable of being rendered inoperable for lifting the package during transport or must be designed with strength equivalent to that required for lifting attachments.**

These requirements apply to DOT-7A, Type A packagings. Indicate below the type of documentation that shows these requirements are met and where the documentation can be found.

Addressed in:	<input type="checkbox"/> Drawing	<input checked="" type="checkbox"/> Operating Instruction
	<input type="checkbox"/> Specification	<input type="checkbox"/> Manufacturer Supplied Data
	<input checked="" type="checkbox"/> Analysis Report	<input type="checkbox"/> Similarity or Documented Record

Specify:

*The maximum gross weight of the SWB is 1,814.37 kg (4,000 lb). The SWB may be mechanically lifted by use of a forklift or straps. The SWB has lifting clips that exceed the required safety factor of three (3). [Tested with a gross weight over 9071.85 kg (20,000 lb) for five minutes with no detectable effect.] Mound evaluated the SWB and an engineering analysis demonstrates that failure of the lifting clips would not impair the ability of the package to meet all other requirements (i.e., the lift clips will fail before the packaging).*

*It should be noted that the lid lift nut that is located in the center of the lid is for lifting only the lid, not the entire package/packaging. An Engineering analysis performed by WHC under Docket 89-07-7A focused on the acceptability of the incorporation of the lift point into the lid panel. The analysis showed that the lifting eye and/or lift point threads will fail prior to the lid panel failure. Additionally, the analysis showed that all containment boundaries will be equal to or greater than the lid panel thickness.*

*Under Docket 98-45-7A, WMNW performed an evaluation for adding an option to place weld filler material on the inside of the lift clips instead of caulk. The purpose of the caulk or filler material is to seal against water and contamination. It was demonstrated that this change does not alter the results of the structural evaluation of lifting clips or affect the structural integrity of the SWB design.*

*Under Docket 01-53-7A, DFSNW performed an evaluation of the changes as identified within Table 1-1 of this final evaluation report. The majority of the changes were due to the reformatting of AWS D1.1 (2000), "Structural Welding Code—Steel." It was demonstrated that the changes identified within Table 1-1 would not alter the structural integrity of the SWB design.*

**173.410(c) External Surface Protrusions, Decontamination.**

**(c) The external surface, as far as practicable, will be free from protruding features and will be easily decontaminated.**

This requirement applies to DOT-7A, Type A packagings. Indicate below the type of documentation that shows this requirement is met and where the documentation can be found.

Addressed in:            ☒ Drawing                      ☐ Operating Instruction  
                              ☒ Specification                ☐ Manufacturer Supplied Data  
                              ☒ Analysis Report            ☐ Similarity or Documented Record

Specify:

***The SWB incorporates "bumpers" that are located on the exterior of each rounded end of the package, and three lifting handles on each straight side of the package. Although these items protrude from the external surface of the package, the materials of construction are such (carbon steel) that the SWB may be easily decontaminated.***

**173.410(d) Outer Layer - Pockets, Crevices (Water Collection).**

**(d) The outer layer of packaging will avoid, as far as practicable, pockets or crevices where water might collect.**

This requirement applies to DOT-7A, Type A packagings. Indicate below the type of documentation that shows this requirement is met and where the documentation can be found.

Addressed in:            ☒ Drawing                      ☐ Operating Instruction  
                              ☒ Specification                ☐ Manufacturer Supplied Data  
                              ☒ Analysis Report            ☐ Similarity or Documented Record

Specify:

***The intent of this requirement is met. There are no pockets or crevices where water might collect.***

**173.410(e) Features Added at Time of Transport.**

**(e) Each feature that is added to the package will not reduce the safety of the package.**

This requirement applies to DOT-7A, Type A packagings that have features added at the time of shipment. Based on the packaging design, indicate below if the requirement applies or does not apply. If the requirement applies, indicate the type of documentation that shows this requirement is met and where the documentation can be found.

This requirement:        ☒ Does not apply.            ☐ Applies; indicate the following.

Addressed in:            ☐ Drawing                      ☐ Operating Instruction  
                              ☐ Specification                ☐ Manufacturer Supplied Data  
                              ☐ Analysis Report            ☐ Similarity or Documented Record

Specify:

***There are no features added at the time of transport. This is a shipper's responsibility.***

**173.410(f) Acceleration, Vibration.**

(f) The package will be capable of withstanding the effects of any acceleration, vibration or vibration resonance that may arise under normal conditions of transport without any deterioration in the effectiveness of the closing devices on the various receptacles or in the integrity of the package as a whole and without loosening or unintentionally releasing the nuts, bolts, or other securing devices even after repeated use (see §§173.24, 173.24a, and 173.24b).

These requirements apply to DOT-7A, Type A packagings. Indicate below the type of documentation that shows these requirements are met and where the documentation can be found.

Addressed in:	<input checked="" type="checkbox"/> Drawing	<input type="checkbox"/> Operating Instruction
	<input checked="" type="checkbox"/> Specification	<input type="checkbox"/> Manufacturer Supplied Data
	<input checked="" type="checkbox"/> Analysis Report	<input type="checkbox"/> Similarity or Documented Record

Specify:

*The DOT-7A Type A testing and evaluation activities for this packaging are recorded under Mound documentation, and under Dockets 89-07-7A, 98-45-7A, and 01-53-7A. The information on the SWB designs may be found in the supporting documentation identified in Section 4.1, Page A-10. Evaluation of the approved SWB designs under Docket 01-53-7A includes the following:*

- *Westinghouse Waste Isolation Division Drawing No. 165-F-001-W1, Revisions L and M.*
- *Westinghouse Waste Isolation Division Drawing No. 165-F-001-W2, Revisions B and C.*
- *Westinghouse Waste Isolation Division Drawing No. 165-F-001-W3, Revisions B and C.*
- *Specification E-I-343, Revision 4, "Specification for Fabrication of the Standard Waste Box."*

*Forty-two (42) rivets are provided within the body tube frame. The rivets meet ASTM A 576, Grade 1008, 1010, 1018, or 1110. Forty-two (42) ½-in. – 13 UNC x 1 ¼-in. socket flat head countersunk cap screws secure the lid to the container body. All lid screw threads are coated with a thread sealant and placed into position. All screws are torqued to 67.8 (-0, + 13.56) N-m [50 ft-lbs (-0, +10)].*

*The gasket assembly is made from closed cell rubber and meets ASTM D 1056. Gasket miters are cut with a knife die and assembly and tolerances are provided on the noted drawing.*

*A total of four (4) filter mounting locations are provided. The packaging must be vented with a minimum of two (2) NucFil-013 filters. The two (2) remaining filter mounting locations must be plugged. The plugs and filters are installed by first applying thread sealant, and then inserting into the mounting locations and tightening to a final torque of 13.56 ±6.78 N-m (10 ±5 ft-lbs).*

*The purpose of this requirement is to prevent the loosening of nuts, bolts, and containment devices under conditions incident to routine transportation. The shipper must ensure the application of quality assurance necessary to achieve this requirement.*

*Based on materials of construction and design, and from previous evaluations by Mound and under Dockets 89-07-7A and 98-45-7A, the SWB designs under Docket 01-53-7A should not experience any negative impact because of the effects of temperature and vibration normally incident to transportation.*

**173.410(g) Physical/Chemical Compatibility, Irradiation.**

**(g) The materials of construction of the packaging and any components or structure will be physically and chemically compatible with each other and with the package contents. The behavior of the packaging and the package contents under irradiation will be taken into account.**

This requirement applies to DOT-7A, Type A packagings. Indicate below the type of documentation that shows this requirement is met and where the documentation can be found.

Addressed in:            ☒ Drawing                    ☐ Operating Instruction  
                              ☒ Specification                ☐ Manufacturer Supplied Data  
                              ☐ Analysis Report            ☐ Similarity or Documented Record

**Specify:**

***The paint system is to be specified by the shipper, as noted in Specification E-I-343, Revision 4. The shipper is responsible to ensure that the paint system, materials of construction, and contents are physically and chemically compatible with each other.***

**173.410(h) Valves – Protection, Enclosure.**

**(h) All valves through which the package contents could escape will be protected against unauthorized operation.**

This requirement applies to DOT-7A, Type A packagings that have valves. Based on the packaging design, determine if the requirement applies or does not apply. If the requirement applies, identify the type of documentation that shows this requirement is met and where the documentation can be found.

This requirement:            ☒ Does not apply.            ☐ Applies; indicate the following.

Addressed in:            ☐ Drawing                            ☐ Operating Instruction  
                              ☐ Specification                   ☐ Manufacturer Supplied Data  
                              ☐ Analysis Report               ☐ Similarity or Documented Record

**Specify:**

***There are no valves incorporated into the SWB designs that have been tested and evaluated.***

**173.410(i) For Transport by Air--**

**(i) For transport by air---**

- (1) The temperature of the accessible surfaces of the package will not exceed 50°C (122°F) at an ambient temperature of 38°C (100°F) with no account taken for insulation;**
- (2) The integrity of containment will not be impaired if the package is exposed to ambient temperatures ranging from -40°C (-40°F) to +55°C (131°F); and**
- (3) Packages containing liquid contents will be capable of withstanding, without leakage, an internal pressure that produces a pressure differential of not less than 95 kPa (13.8 lb/in<sup>2</sup>).**

These requirements apply to DOT-7A, Type A packagings used for transport by aircraft. Based on the mode of transportation, indicate below if the requirements apply or do not apply. If the requirements apply, identify the type of documentation that shows these requirements are met and where the documentation can be found.

These requirements:      ☒ Do not apply.      ☐ Apply; indicate the following.

Addressed in:      ☐ Drawing      ☐ Operating Instruction  
                          ☐ Specification      ☐ Manufacturer Supplied Data  
                          ☐ Analysis Report      ☐ Similarity or Documented Record

Specify:

***The SWB is not authorized for air transport. The SWB is not authorized for liquid contents.***

#### **4.6 49 CFR 173.412 ADDITIONAL DESIGN REQUIREMENTS FOR TYPE A PACKAGES.**

##### **173.412 Tamper Indication.**

**In addition to meeting the general design requirements prescribed in §173.410, each Type A packaging must be designed so that—**

- (a) The outside of the packaging incorporates a feature, such as a seal, that is not readily breakable, and that, while intact, is evidence that the package has not been opened. In the case of packages shipped in closed transport vehicles in exclusive use, the cargo compartment, instead of the individual packages, may be sealed.**

This requirement applies to DOT-7A, Type A packagings. Indicate below the type of documentation that shows this requirement is met and where the documentation can be found.

Addressed in:            ☐ Drawing                            ☐ Operating Instruction  
                             ☐ Specification                    ☐ Manufacturer Supplied Data  
                             ☐ Analysis Report                ☒ Similarity or Documented Record

Specify:

***It is the responsibility of the shipper to ensure that appropriate precautions are taken to seal the package in a manner that will provide evidence that the package has not been opened.***

##### **173.412(b) Smallest External Dimension.**

- (b) The smallest external dimension of the package is not less than 10 centimeters (4 inches);**

This requirement applies to DOT-7A, Type A packagings. Indicate below the type of documentation that shows this requirement is met and where the documentation can be found.

Addressed in:            ☒ Drawing                            ☐ Operating Instruction  
                             ☐ Specification                    ☐ Manufacturer Supplied Data  
                             ☐ Analysis Report                ☐ Similarity or Documented Record

Specify:

***This requirement is met as the external dimension of the package is much larger than 10 cm (4 in.).***



**173.412(c) Containment and Shielding.**

(c) Containment and shielding is maintained during transportation and storage in a temperature range of -40°C (-40°F) to 70°C (158°F). Special attention shall be given to liquid contents and to the potential degradation of the packaging materials within the temperature range.

This requirement applies to DOT-7A, Type A packagings. Indicate below the type of documentation that shows this requirement is met and where the documentation can be found.

Addressed in:	<input checked="" type="checkbox"/> Drawing	<input type="checkbox"/> Operating Instruction
	<input checked="" type="checkbox"/> Specification	<input type="checkbox"/> Manufacturer Supplied Data
	<input type="checkbox"/> Analysis Report	<input type="checkbox"/> Similarity or Documented Record

Specify:

*The materials of construction meet the intent of this requirement. The gasket material is made of closed cell rubber and meets the ASTM D 1056, Type 2, Class A, Grade 2, Suffix A<sub>1</sub> and F<sub>1</sub> requirements of -40 °C to 100 °C (-40 °F to 212 °F).*

**173.412(d) Secure Containment System.**

(d) The packaging must include a containment system securely closed by a positive fastening device that cannot be opened unintentionally or by pressure that may arise within the package during normal transport. Special form Class 7 (radioactive) material, as demonstrated in accordance with §173.469, may be considered as a component of the containment system. If the containment system forms a separate unit of the package, it must be securely closed by a positive fastening device that is independent of any other part of the package.

This requirement applies to DOT-7A, Type A packagings. Indicate below the type of documentation that shows this requirement is met and where the documentation can be found.

Addressed in:	<input checked="" type="checkbox"/> Drawing	<input type="checkbox"/> Operating Instruction
	<input checked="" type="checkbox"/> Specification	<input type="checkbox"/> Manufacturer Supplied Data
	<input checked="" type="checkbox"/> Analysis Report	<input type="checkbox"/> Similarity or Documented Record

Specify:

*The containment system consists of 10 gauge carbon steel lid, body, and bottom. The gasket material is made from closed cell rubber and meets ASTM D 1056, Type 2, Class A, Grade 2, Suffix A<sub>1</sub> and F<sub>1</sub>.*

*Forty-two (42) rivets are provided within the body tube frame. The rivets meet ASTM A 576, Grade 1008, 1010, 1018, or 1110. Forty-two (42) ½-in. – 13 UNC x 1 ¼-in. socket flat head countersunk cap screws secure the lid to the container body. All lid screw threads are coated with a thread sealant and placed into position. All screws are torqued to 67.8 (-0, +13.56) N-m [50 ft-lbs (-0, +10)].*

*A total of four (4) filter mounting locations are provided. The packaging must be vented with a minimum of two (2) NucFil-013 filters. The two (2) remaining filter mounting locations must be plugged. The plugs and filters are installed by first applying thread sealant, and then inserting into the mounting locations and tightening to a final torque of 13.56 ±6.78 N-m (10 ±5 ft-lbs).*

**173.412(e) Radiolytic Decomposition, Chemical Reaction, Radiolysis.**

(e) For each component of the containment system account is taken, where applicable, of radiolytic decomposition of materials and the generation of gas by chemical reaction and radiolysis.

This requirement applies to DOT-7A, Type A packagings. Indicate below the type of documentation that shows this requirement is met and where the documentation can be found.

Addressed in:      ☐ Drawing                      ☐ Operating Instruction  
                         ☐ Specification                      ☐ Manufacturer Supplied Data  
                         ☐ Analysis Report                      ☒ Similarity or Documented Record

**Specify:**

***It is the responsibility of the shipper to ensure that the effects of radiation from the payload will not degrade the performance of the packaging through gas generation, chemical reaction, or radiolysis. The materials of construction for the SWB are similar to the packagings commonly used for radioactive material transport.***

**173.412(f) Reduction of Ambient Pressure.**

**(f) The containment system will retain its radioactive contents under the reduction of ambient pressure to 25 kPa (3.6 pounds per square inch).**

This requirement applies to DOT-7A, Type A packagings. Indicate below the type of documentation that shows this requirement is met and where the documentation can be found.

Addressed in:        ☒ Drawing                    ☐ Operating Instruction  
                         ☒ Specification                ☐ Manufacturer Supplied Data  
                         ☒ Analysis Report            ☐ Similarity or Documented Record

**Specify:**

*The containment system consists of 10 gauge carbon steel lid, body, and bottom. The gasket material is made from closed cell rubber and meets ASTM D 1056, Type 2, Class A, Grade 2, Suffix A1 and F1.*

*Forty-two (42) rivets are provided within the body tube frame. The rivets meet ASTM A 576, Grade 1008, 1010, 1018, or 1110. Forty-two (42) ½-in. – 13 UNC x 1 ¾-in. socket flat head countersunk cap screws secure the lid to the container body. All lid screw threads are coated with a thread sealant and placed into position. All screws are torqued to 67.8 (-0, +13.56) N-m [50 ft-lbs (-0, +10)].*

***A total of four (4) filter mounting locations are provided. The packaging must be vented with a minimum of two (2) NucFil-013 filters. The two (2) remaining filter mounting locations must be plugged. The plugs and filters are installed by first applying thread sealant, and then inserting into the mounting locations and tightening to a final torque of 13.56 ±6.78 N-m (10 ±5 ft-lbs).***

**173.412(g) Valve - Protection, Enclosure.**

**(g) Each valve, other than a pressure relief device, is provided with an enclosure to retain any leakage.**

This requirement applies to DOT-7A, Type A packagings. Indicate below the type of documentation that shows this requirement is met and where the documentation can be found.

Addressed in:            ☐ Drawing                      ☐ Operating Instruction  
                             ☐ Specification                ☐ Manufacturer Supplied Data  
                             ☐ Analysis Report              ☐ Similarity or Documented Record

Specify:

***There are no valves utilized in the SWB design.***

**173.412(h) Shielding (Enclosure).**

**(h) Any radiation shield that encloses a component of the packaging specified as part of the containment system will prevent the unintentional escape of that component from the shield.**

This requirement applies to DOT-7A, Type A packagings. Indicate below the type of documentation that shows this requirement is met and where the documentation can be found.

Addressed in:            ☐ Drawing                      ☐ Operating Instruction  
                             ☐ Specification                ☐ Manufacturer Supplied Data  
                             ☐ Analysis Report              ☐ Similarity or Documented Record

Specify:

***This requirement does not apply. Shielding is not a component of the SWB design.***

**173.412(i) Tiedown (Failure).**

**(i) Failure of any tie-down attachment that is a structural part of the packaging, under both normal and accident conditions, must not impair the ability of the package to meet other requirements of this subpart.**

This requirement applies to DOT-7A, Type A packagings. Indicate below the type of documentation that shows this requirement is met and where the documentation can be found.

Addressed in:            ☐ Drawing                            ☐ Operating Instruction  
                               ☐ Specification                   ☐ Manufacturer Supplied Data  
                               ☒ Analysis Report           ☐ Similarity or Documented Record

Specify:

***The SWB does not incorporate tiedown attachments. The lifting clips were not evaluated for use as a tiedown attachment. It is up to the shipper to determine if such an attachment is used, that this requirement is met.***

**173.412(j) Evaluation and Testing.**

**(j) When evaluated against the performance requirements of this section and the tests specified in §173.465 or using any of the methods authorized by §173.461(a), the packaging will prevent--**  
                               (1) Loss or dispersal of the radioactive contents; and  
                               (2) A significant increase in the radiation levels recorded or calculated at the external surfaces for the condition before the test.

**NOTE:** A significant increase may be defined as, "Loss of shielding integrity which would result in more than a 20 percent increase in the radiation level at any external surface of the package" [TS-R-1 (ST-1 Revised), para. 646].

This requirement applies to DOT-7A, Type A packagings. Indicate below the type of documentation that shows this requirement is met and where the documentation can be found.

Addressed in:            ☐ Drawing                            ☐ Operating Instruction  
                               ☐ Specification                   ☐ Manufacturer Supplied Data  
                               ☒ Analysis Report           ☐ Similarity or Documented Record

Specify:

***The DOT-7A Type A testing and evaluation activities for this packaging are recorded under Mound documentation, and under Dockets 89-07-7A, 98-45-7A, and 01-53-7A. The information on the SWB designs tested and evaluated under the DOE's DOT-7A Type A Testing Program may be found in the supporting documentation identified in Section 4.1 on Page A-10.***

***Evaluation of the approved SWB designs under Docket 01-53-7A-7A includes the following:***

- ***Westinghouse Waste Isolation Division Drawing No. 165-F-001-W1, Revisions L and M.***
- ***Westinghouse Waste Isolation Division Drawing No. 165-F-001-W2, Revisions B and C.***
- ***Westinghouse Waste Isolation Division Drawing No. 165-F-001-W3, Revisions B and C.***
- ***Specification E-I-343, Revision 4, "Specification for Fabrication of the Standard Waste Box."***

***(Continued onto next page)***

**173.412(j) Evaluation and Testing.** (continued)

*The SWB meets the requirements of this paragraph. The shipper must ensure that the radiation level at any surface of the packaging will not increase significantly [i.e., by more than 20 percent as required by TS-R-1 (ST-1 Revised), paragraph 646] as a result of the decrease in distance to the center of the package load. During transport, consideration of the internal load and shifting of contents needs to be taken into account.*

**173.412(k) Design Requirement for Liquid Packagings.**

**(k) Each packaging designed for liquids will—**

- (1) Be designed to provide for ullage to accommodate variations in temperature of the contents, dynamic effects and filling dynamics;**

This requirement applies to DOT-7A, Type A packagings for use in transporting liquids. Based on the packaging design, indicate below if the requirement applies or not. If the requirement applies, identify the type of documentation that shows this requirement is met and where the documentation can be found.

This requirement:	<input checked="" type="checkbox"/> Does not apply.	<input type="checkbox"/> Applies; indicate the following.
Addressed in:	<input type="checkbox"/> Drawing	<input type="checkbox"/> Operating Instruction
	<input type="checkbox"/> Specification	<input type="checkbox"/> Manufacturer Supplied Data
	<input type="checkbox"/> Analysis Report	<input type="checkbox"/> Similarity or Documented Record

Specify:

***Liquids are not authorized for use in the SWB.***

**173.412(k)(2) Evaluation and Testing of Liquid Packagings.**

- (2) Meet the conditions prescribed in paragraph (j) of this section when subjected to the tests specified in §173.466 or evaluated against these tests by any of the methods authorized by §173.461(a); and**

This requirement applies to DOT-7A, Type A packagings for use in transporting liquids. Based on the packaging design, indicate below if the requirement applies or not. If the requirement applies, identify the type of documentation that shows this requirement is met and where the documentation can be found.

This requirement:	<input checked="" type="checkbox"/> Does not apply.	<input type="checkbox"/> Applies; indicate the following.
Addressed in:	<input type="checkbox"/> Drawing	<input type="checkbox"/> Operating Instruction
	<input type="checkbox"/> Specification	<input type="checkbox"/> Manufacturer Supplied Data
	<input type="checkbox"/> Analysis Report	<input type="checkbox"/> Similarity or Documented Record

Specify:

***Liquids are not authorized for use in the SWB.***

**173.412(k)(3) Choice of Design Requirement for Liquid Packagings.****(3) Either--**

- (i) Have sufficient suitable absorbent material to absorb twice the volume of the liquid contents. The absorbent material must be compatible with the package contents and suitably positioned to contact the liquid in the event of leakage; or
- (ii) Have a containment system composed of primary inner and secondary outer containment components designed to assure retention of the liquid contents within the secondary outer component in the event that the primary inner component leaks.

This requirement applies to DOT-7A, Type A packagings for use in transporting liquids. Based on the packaging design, indicate below if the requirement applies or not. If the requirement applies, identify the type of documentation that shows this requirement is met and where the documentation can be found.

This requirement:        ☒ Does not apply.        ☐ Applies; indicate the following.

Addressed in:            ☐ Drawing                                ☐ Operating Instruction  
                               ☐ Specification                            ☐ Manufacturer Supplied Data  
                               ☐ Analysis Report                        ☐ Similarity or Documented Record

Specify:

***Liquids are not authorized for use in the SWB.***

**173.412(l) Evaluation and Testing of Gas Packagings.**

- (l) Each packaging designed for gases, other than tritium not exceeding 40 TBq (1000 Ci) or noble gases not exceeding the A2 value appropriate for the noble gas, will be able to prevent loss or dispersal of contents when the package is subjected to the tests prescribed in §173.466 or evaluated against these tests by any of the methods authorized by §173.461(a).

This requirement applies to DOT-7A, Type A packagings for use in transporting gases. Based on the packaging design, indicate below if the requirement applies or not. If the requirement applies, identify the type of documentation that shows this requirement is met and where the documentation can be found.

This requirement:        ☒ Does not apply.        ☐ Applies; indicate the following.

Addressed in:            ☐ Drawing                                ☐ Operating Instruction  
                               ☐ Specification                            ☐ Manufacturer Supplied Data  
                               ☐ Analysis Report                        ☐ Similarity or Documented Record

Specify:

***The SWB is not authorized for the transport of gas materials.***

#### 4.7 49 CFR 173.465 TYPE A PACKAGING TESTS.

##### 173.465(a) Packaging Tests.

(a) The packaging, with contents, must be capable of withstanding the water spray, free drop, stacking and penetration tests prescribed in this section. One prototype may be used for all tests if the requirements of paragraph (b) of this section are met.

This requirement applies to DOT-7A, Type A packagings. Indicate below the type of documentation that shows this requirement is met and where the documentation can be found.

Addressed in:	<input type="checkbox"/> Drawing	<input type="checkbox"/> Operating Instruction
	<input type="checkbox"/> Specification	<input type="checkbox"/> Manufacturer Supplied Data
	<input checked="" type="checkbox"/> Analysis Report	<input type="checkbox"/> Similarity or Documented Record

Specify:

*The DOT-7A Type A testing and evaluation activities for this packaging are recorded under Mound documentation, and under Dockets 89-07-7A, 98-45-7A, and 01-53-7A. The information on the SWB designs may be found in the supporting documentation identified in Section 4.1, Page A-10.*

*For Docket 89-07-7A, WHC determined by evaluation that the incorporation of the lid lifting point will have no effect on the packaging for performance of meeting the requirements. The analysis showed that the lifting eye and/or lift point threads will fail prior to the lid panel failure. Additionally, the analysis showed that all containment boundaries will be equal to or greater than the lid panel thickness.*

*Under Docket 98-45-7A, WMNW determined by evaluation that the design changes identified in drawing 165-F-001-W1 (Revisions F through K); and drawing 165-F-001-W2 and W3 (Revision A); and Specification E-I-343 (Revision 3), would not have a negative effect on the integrity of the packaging. By comparison, due to the materials of construction and the design, the SWB designs documented within this docket were found to meet this requirement.*

*Under Docket 01-53-7A, DFSNW performed an evaluation of the changes as identified within Table 1-1 of this final evaluation report. The majority of the changes were due to the reformatting of AWS D1.1 (2000), "Structural Welding Code—Steel." It was demonstrated that the changes identified within Table 1-1 would not alter the structural integrity of the SWB design.*

*Due to the materials of construction and the design, the SWB designs as documented above meet this requirement.*

**173.465(b) Water Spray.**

(b) *Water spray test.* The water spray test must precede each test or test sequence prescribed in this section. The water spray test must simulate exposure to rainfall of approximately 5 centimeters (2 inches) per hour for at least one hour. The time interval between the end of the water spray test and the beginning of the next test must be such that the water has soaked in to the maximum extent without appreciable drying of the exterior of the specimen. In the absence of evidence to the contrary, this interval may be assumed be two hours if the water spray is applied from four different directions simultaneously. However, no time interval may elapse if the water spray is applied from each of the four directions consecutively.

This requirement applies to DOT-7A, Type A packagings. Indicate below the type of documentation that shows this requirement is met and where the documentation can be found.

Addressed in:	<input type="checkbox"/> Drawing	<input type="checkbox"/> Operating Instruction
	<input type="checkbox"/> Specification	<input type="checkbox"/> Manufacturer Supplied Data
	<input checked="" type="checkbox"/> Analysis Report	<input type="checkbox"/> Similarity or Documented Record

Specify:

*The DOT-7A Type A testing and evaluation activities for this packaging are recorded under Mound documentation, and under Dockets 89-07-7A, 98-45-7A, and 01-53-7A. The information on the SWB designs may be found in the supporting documentation identified in Section 4.1, Page A-10.*

*Under Mound, the water spray test was conducted on the bolted design prior to each of the Type A tests. In all cases the packagings passed the performance requirements. In addition, the box was tested empty to evaluate the potential inleakage of water. Test Unit No. 1 was opened and inspected for the presence of water. None was found.*

*Docket 89-07-7A – By evaluation, WHC determined that the incorporation of the lid lifting point has no effect on the packaging for performance of meeting this test requirement. An engineering analysis was performed on the acceptability of incorporating a lift point into the lid panel. The referenced drawing was 165-F-001W1, Rev. F, and the Specification was dated April 19, 1989. The analysis showed that the lifting eye and/or lift point threads will fail prior to the lid panel failure. Additionally, the analysis showed that all containment boundaries will be equal to or greater than the lid panel thickness.*

*Under Docket 98-45-7A, WMNW determined by evaluation that the design changes identified in drawing 165-F-001-W1 (Revisions F through K); and drawing 165-F-001-W2 and W3 (Revision A); and Specification E-I-343 (Revision 3), would not have a negative effect on the integrity of the packaging. By comparison, due to the materials of construction and the design, the SWB designs documented within this docket were found to meet this requirement.*

*Under Docket 01-53-7A, DFSNW performed an evaluation of the changes as identified within Table 1-1 of this final evaluation report. The majority of the changes were due to the reformatting of AWS D1.1 (2000), "Structural Welding Code—Steel." It was demonstrated that the changes identified within Table 1-1 would not alter the structural integrity of the SWB design.*

*By comparison, due to the materials of construction and the design, the SWB designs as documented above meet this requirement.*



**173.465(c) Free Drop.**

**(c) Free drop test.** The specimen must drop onto the target so as to suffer maximum damage to the safety features being tested, and:

This requirement applies to DOT-7A, Type A packagings. Indicate below the type of documentation that shows this requirement is met and where the documentation can be found.

Addressed in:            ☐ Drawing                            ☐ Operating Instruction  
                              ☐ Specification                   ☐ Manufacturer Supplied Data  
                              ☒ Analysis Report               ☐ Similarity or Documented Record

Specify:

*The DOT-7A Type A testing and evaluation activities for this packaging are recorded under Mound documentation, and under Dockets 89-07-7A, 98-45-7A, and 01-53-7A. Information may be found as provided in Section 4.1, Page A-10.*

*Under Mound, the 1.2-m (4-ft) drop test was conducted on several packagings. Test result documentation may be found in DOE/RL 96-57, Vol. 1. Following is a summary:*

- *Test Unit TU-1A was loaded with flour, fluorescein, and sand (F/F/S) to a weight of 1,832.51 kg (4,040 lb). The contents represented material form numbers 1 and 2. The test unit was dropped onto the top corner. Resulting damage included only a minor dent at the point of impact.*
- *Test Unit TU-1B was loaded with F/F/S to a weight of 1,859.73 kg (4,100 lb). The contents represented material form numbers 1 and 2. The test unit was dropped twice onto a bottom corner. The resulting damage included a dent of 10.16 cm (4 in.).*
- *Test Unit TU-2 was loaded with debris to represent material form numbers 3 and 4. F/F was added to represent material form number 1. The weight of this test unit was 1,856.10 kg (4,092 lb). The test unit was dropped flat on an end. The only damage resulted in minor dents on the end surface.*
- *Test Unit TU-3B was loaded with 4 steel drums to represent material form number 5. F/F was added to represent material form number 1. The weight of this test unit was 1,859.73 kg (4,100 lb). The test unit was dropped onto the top corner. Resulting damage included minor dents at the point of impact due to the inner drums.*
- *Test Unit TU-3B(1B). Test Unit 1B was emptied and refilled with 4 steel drums to represent material form number 5. F/F was added to represent material form number 1. The weight of this test unit was 1,859.73 kg (4,100 lb). The test unit was dropped onto the top corner. The resulting damage included minor dents at the point of impact due to the inner drums.*

*Docket 89-07-7A – By evaluation, WHC determined that the incorporation of the lid lifting point has no effect on the packaging for performance of meeting this test requirement.*

*Under Docket 98-45-7A, WMNW determined by evaluation that the design changes identified in drawing 165-F-001-W1 (Revisions F through K); and drawing 165-F-001-W2 and W3 (Revision A); and Specification E-I-343 (Revision 3), would not have a negative effect on the integrity of the packaging. By comparison, due to the materials of construction and the design, the SWB designs documented within this docket were found to meet this requirement.*

*Under Docket 01-53-7A, DFSNW performed an evaluation of the changes as identified within Table 1-1 of this final evaluation report. The majority of the changes were due to the reformatting of AWS D1.1 (2000), "Structural Welding Code—Steel." It was demonstrated that the changes identified within Table 1-1 would not alter the structural integrity of the SWB design.*

*By comparison, due to the materials of construction and design, the SWB designs as documented above meet this requirement.*

**173.465(c)(1) Free Drop.**

(1) The height of the drop measured from the lowest point of the specimen to the upper surface of the target may not be less than the distance specified in Table 12, for the applicable package mass. The target must be as specified in §173.465(c)(5). Table 12 is as follows:

Table 12.--Free Drop Distance for testing Packages to Normal Conditions of Transport	
Packaging mass kilograms (pounds)	Free drop distance Meters (feet)
< mass 5,000 (11,000)	1.2 (4)
5,000 (11,000) mass to 10,000 (22,000)	0.9 (3)
10,000 (22,000) mass to 15,000 (33,000)	0.6 (2)
> 15,000 (33,000) mass	0.3 (1)

This requirement applies to DOT-7A, Type A packagings. Indicate below the type of documentation that shows this requirement is met and where the documentation can be found.

Addressed in:            ☐ Drawing                      ☐ Operating Instruction  
                              ☐ Specification                ☐ Manufacturer Supplied Data  
                              ☒ Analysis Report            ☐ Similarity or Documented Record

Specify:

*DOT-7A Type A testing and evaluation activities are recorded under Mound documentation, and under Dockets 89-07-7A, 98-45-7A, and 01-53-7A. Information may be found as provided in Section 4.1, Page A-10.*

*Under Mound, the 1.2-m (4-ft) drop test was conducted on several packagings. The target was as specified under §173.465(c)(5).*

**173.465(c)(2) Free Drop.**

**(2) For packages containing fissile material, the free drop test specified in paragraph (c)(1) of this section must be preceded by a free drop from a height of 0.3 meter (1 foot) on each corner, or in the case of cylindrical packages, onto each of the quarters of each rim.**

This requirement applies to DOT-7A, Type A packagings for use in transporting fissile material. Based on the load, indicate below if the requirement applies or not. If the requirement applies, identify the type of documentation that shows this requirement is met and where the documentation can be found.

This requirement:      ☒ Does not apply.      ☐ Applies; indicate the following.

Addressed in:            ☐ Drawing                      ☐ Operating Instruction  
                               ☐ Specification               ☐ Manufacturer Supplied Data  
                               ☐ Analysis Report            ☐ Similarity or Documented Record

Specify:

***Testing and evaluation was not conducted for this requirement. The SWB is not approved for Type A package shipments of fissile material.***

**173.465(c)(3) Free Drop.**

**(3) For fiberboard or wood rectangular package with a mass of 50 kilograms (110 pounds) or less, a separate specimen must be subjected to a free drop onto each corner from a height of 0.3 meter (1 foot).**

This requirement applies to rectangular DOT-7A, Type A packagings constructed of fiberboard or wood that have a gross weight of 50 kilograms (110 pounds) or less. Based on the materials of construction and the gross weight of the package, indicate below if the requirement applies or not. If the requirement applies, identify the type of documentation that shows this requirement is met and where the documentation can be found.

This requirement:      ☒ Does not apply.      ☐ Applies; indicate the following.

Addressed in:            ☐ Drawing                      ☐ Operating Instruction  
                               ☐ Specification               ☐ Manufacturer Supplied Data  
                               ☐ Analysis Report            ☐ Similarity or Documented Record

Specify:

***Testing and evaluation was not conducted for this requirement. The SWB is not made from fiberboard or wood.***

**173.465(c)(4) Free Drop.**

**(4) For cylindrical fiberboard packages with a mass of 100 kilograms (220 pounds) or less, a separate specimen must be subjected to a free drop onto each of the quarters of each rim from a height of 0.3 meter (1 foot).**

This requirement applies to cylindrical DOT-7A, Type A packagings constructed of fiberboard having a gross weight of 100 kilograms (220 pounds) or less. Based on the shape and the gross weight of the package, indicate below if the requirement applies or not. If the requirement applies, identify the type of documentation that shows this requirement is met and where the documentation can be found.

This requirement:      ☒ Does not apply.      ☐ Applies; indicate the following.

Addressed in:            ☐ Drawing                      ☐ Operating Instruction  
                                  ☐ Specification                ☐ Manufacturer Supplied Data  
                                  ☐ Analysis Report              ☐ Similarity or Documented Record

Specify:

***Testing and evaluation was not conducted for this requirement. The SWB is not a cylindrical package that is made from fiberboard.***

**173.465(c)(5) Free Drop.**

**(5) The target for the free drop test must be a flat, horizontal surface of such mass and rigidity that any increase in its resistance to displacement or deformation upon impact by the specimen would not significantly increase the damage to the specimen.**

This requirement applies to DOT-7A, Type A packagings. Indicate below the type of documentation that shows this requirement is met and where the documentation can be found.

Addressed in:            ☐ Drawing                      ☐ Operating Instruction  
                                  ☐ Specification                ☐ Manufacturer Supplied Data  
                                  ☒ Analysis Report              ☐ Similarity or Documented Record

Specify:

***Testing was conducted and documented by Mound as provided in Section 4.1, Page A-10. The test pad target used meets this requirement as documented by Mound.***

**173.465(d) Stacking Test.**

**(d) *Stacking test.***

- (1) The specimen must be subjected for a period of at least 24 hours to a compressive load equivalent to the greater of the following:
  - (i) Five times the mass of the actual package; or
  - (ii) The equivalent of 13 kilopascals (1.9 pounds per square inch) multiplied by the vertically projected area of the package.
- (2) The compressive load must be applied uniformly to two opposite sides of the specimen, one of which must be the base on which the package would normally rest.

This requirement applies to DOT-7A, Type A packagings. Indicate below the type of documentation that shows this requirement is met and where the documentation can be found.

Addressed in:            ☐ Drawing                            ☐ Operating Instruction  
                              ☐ Specification                       ☐ Manufacturer Supplied Data  
                              ☒ Analysis Report                   ☐ Similarity or Documented Record

Specify:

*The DOT-7A Type A testing and evaluation activities for this packaging are recorded under Mound documentation, and under Dockets 89-07-7A, 98-45-7A, and 01-53-7A. Information may be found as provided in Section 4.1, Page A-10.*

*Under Mound, the compression test was conducted on one packaging (TU-2). The authorized gross weight of the SWB is 1,814.37 kg (4,000 lb). The compressive weight applied was 9,573.07 kg (21,105 lb) for over a 24-hour period. The compression test had no detectable effect, and there was no loss of contents as evidenced by an inspection for fluorescein using ultraviolet light.*

*Docket 89-07-7A – By evaluation, WHC determined that the incorporation of the lid lifting point has no effect on the packaging for performance of meeting this test requirement.*

*Under Docket 98-45-7A, WMNW determined by evaluation that the design changes identified in drawing 165-F-001-W1 (Revisions F through K); and drawing 165-F-001-W2 and W3 (Revision A); and Specification E-I-343 (Revision 3), would not have a negative effect on the integrity of the packaging. By comparison, due to the materials of construction and the design, the SWB designs documented within this docket were found to meet this requirement.*

*Under Docket 01-53-7A, DFSNW performed an evaluation of the changes as identified within Table 1-1 of this final evaluation report. The majority of the changes were due to the reformatting of AWS D1.1 (2000), "Structural Welding Code—Steel." It was demonstrated that the changes identified within Table 1-1 would not alter the structural integrity of the SWB design.*

*By comparison, due to the materials of construction and design, the SWB designs as documented above meet this requirement.*

**173.465(e) Penetration Test.**

**(c) Penetration test.** For the penetration test, the specimen must be placed on a rigid, flat, horizontal surface that will not move significantly while the test is being performed.

- (1) A bar of 3.2 centimeters (1.25 inches) in diameter with a hemispherical end and a mass of 6 kilograms (13.2 pounds) must be dropped and directed to fall with its longitudinal axis vertical, onto the center of the weakest part of the specimen, so that, if it penetrates far enough, it will hit the containment system. The bar may not be significantly deformed by the test; and
- (2) The height of the drop of the bar measured from its lower end to the intended point of impact on the upper surface of the specimen must be 1 meter (3.3 feet) or greater.

This requirement applies to DOT-7A, Type A packagings. Indicate below the type of documentation that shows this requirement is met and where the documentation can be found.

Addressed in:            ☐ Drawing                            ☐ Operating Instruction  
                              ☐ Specification                   ☐ Manufacturer Supplied Data  
                              ☒ Analysis Report               ☐ Similarity or Documented Record

Specify:

*The DOT-7A Type A testing and evaluation activities for this packaging are recorded under Mound documentation, and under Dockets 89-07-7A, 98-45-7A, and 01-53-7A. Information may be found as provided in Section 4.1, Page A-10.*

*Under Mound, two penetration tests were conducted on test unit TU-1. The first penetration bar drop was onto the center of the container lid. There was no effect, not even a minor dent. The second penetration bar drop was onto the filter housing. The filter housing was scuffed/scraped at the point of impact, but that was the only visible effect. An inspection with an ultraviolet light provided no indication of fluorescein.*

*Docket 89-07-7A – By evaluation, WHC determined that the incorporation of the lid lifting point has no effect on the packaging for performance of meeting this test requirement.*

*Under Docket 98-45-7A, WMNW determined by evaluation that the design changes identified in drawing 165-F-001-W1 (Revisions F through K); and drawing 165-F-001-W2 and W3 (Revision A); and Specification E-I-343 (Revision 3), would not have a negative effect on the integrity of the packaging. By comparison, due to the materials of construction and the design, the SWB designs documented within this docket were found to meet this requirement.*

*Under Docket 01-53-7A, DFSNW performed an evaluation of the changes as identified within Table 1-1 of this final evaluation report. The majority of the changes were due to the reformatting of AWS D1.1 (2000), "Structural Welding Code—Steel." It was demonstrated that the changes identified within Table 1-1 would not alter the structural integrity of the SWB design.*

*By comparison, due to the materials of construction and design, the SWB designs as documented above meet this requirement.*

#### 4.8 49 CFR 173.466 ADDITIONAL TESTS FOR TYPE A PACKAGING DESIGNED FOR LIQUIDS AND GASES.

##### 173.466(a) Additional Tests.

(a) In addition to the tests prescribed in §173.465, Type A packagings designed for liquids and gases must be capable of withstanding the following tests:

- (1) *Free drop test.* The packaging specimen must drop onto the target so as to suffer the maximum damage to its containment. The height of the drop measured from the lowest part of the packaging specimen to the upper surface of the target must be 9 meters (30 feet) or greater. The target must be as specified in §173.465(c)(5).
- (2) *Penetration test.* The specimen must be subjected to the test specified in §173.465(e) except that the height of the drop must be 1.7 meters (5.5 feet).

This requirement applies only to DOT-7A, Type A packagings used to transport liquids or gases. Based on the contents of the package, indicate below if the requirement applies or not. If the requirement applies, identify the type of documentation that shows this requirement is met and where the documentation can be found.

This requirement:            ☒ Does not apply.            ☐ Applies; indicate the following.

Addressed in:                ☐ Drawing                                ☐ Operating Instruction  
                                  ☐ Specification                           ☐ Manufacturer Supplied Data  
                                  ☐ Analysis Report                        ☐ Similarity or Documented Record

Specify:

*The SWB is not authorized for use with liquid or gas contents. Testing and/or evaluation were not performed for this requirement.*

## 5.0 49 CFR 173.462 PREPARATION OF SPECIMENS FOR TESTING

### 173.462(a) Inspection.

- (a) Each specimen (i.e., sample, prototype or scale model) must be examined before testing to identify and record faults or damage, including:
- (1) Divergence from the specifications or drawings;
  - (2) Defects in construction;
  - (3) Corrosion or other deterioration; and
  - (4) Distortion of features.

This requirement applies to DOT-7A, Type A packagings. Indicate below the type of documentation that shows this requirement is met and where the documentation can be found.

Addressed in:            ☐ Drawing                      ☐ Operating Instruction  
                             ☐ Specification                ☐ Manufacturer Supplied Data  
                             ☒ Analysis Report            ☐ Similarity or Documented Record

Specify:

*The DOT-7A Type A testing and evaluation activities for this packaging are recorded under Mound documentation, and under Dockets 89-07-7A, 98-45-7A, and 01-53-7A. Information may be found as provided in Section 4.1, Page A-10.*

*Evaluation of the approved SWB designs under Docket 01-53-7A includes the following:*

- *Westinghouse Waste Isolation Division Drawing No. 165-F-W1, Revision L and M.*
- *Westinghouse Waste Isolation Division Drawing No. 165-F-W2, Revision B and C.*
- *Westinghouse Waste Isolation Division Drawing No. 165-F-W3, Revision B and C.*
- *Specification E-I-343, Revision 4, "Specification for Fabrication of the Standard Waste Box."*

*The SWB designs documented above meet this requirement.*



**173.462(b) Correction.**

**(b) Any deviation found under paragraph (a) of this section from the specified design must be corrected or appropriately taken into account in the subsequent evaluation.**

This requirement applies to DOT-7A, Type A packagings. Indicate below the type of documentation that shows this requirement is met and where the documentation can be found.

Addressed in:            ☐ Drawing                            ☐ Operating Instruction  
                              ☐ Specification                   ☐ Manufacturer Supplied Data  
                              ☒ Analysis Report               ☐ Similarity or Documented Record

Specify:

***The DOT-7A Type A testing and evaluation activities for this packaging are recorded under Mound documentation, and under Dockets 89-07-7A, 98-45-7A, and 01-53-7A. Information may be found as provided in Section 4.1, Page A-10.***

***Evaluation of the approved SWB designs under Docket 01-53-7A includes the following:***

- ***Westinghouse Waste Isolation Division Drawing No. 165-F-W1, Revision L and M.***
- ***Westinghouse Waste Isolation Division Drawing No. 165-F-W2, Revision B and C.***
- ***Westinghouse Waste Isolation Division Drawing No. 165-F-W3, Revision B and C.***
- ***Specification E-I-343, Revision 4, "Specification for Fabrication of the Standard Waste Box."***

***The SWB designs documented above meet this requirement.***

**173.462(c) Identify Containment System.**

**(c) The containment system of the packaging must be clearly specified.**

This requirement applies to DOT-7A, Type A packagings. Indicate below the type of documentation that shows this requirement is met and where the documentation can be found.

Addressed in:            ☒ Drawing                            ☐ Operating Instruction  
                              ☒ Specification                   ☐ Manufacturer Supplied Data  
                              ☒ Analysis Report               ☐ Similarity or Documented Record

Specify:

***The containment system consists of 10 gauge carbon steel lid, body, and bottom. The gasket material is made from closed cell rubber and meets ASTM D 1056, Type 2, Class A, Grade 2, Suffix A1 and F1.***

***Forty-two (42) rivets are provided within the body tube frame. The rivets meet ASTM A 576, Grade 1008, 1010, 1018, or 1110. Forty-two (42) ½-in. – 13 UNC x 1 ¾-in. socket flat head countersunk cap screws secure the lid to the container body. All lid screw threads are coated with a thread sealant and placed into position. All screws are torqued to 67.8 (-0, +13.56) N-m [50 ft-lbs (-0, +10)].***

***A total of four (4) filter mounting locations are provided. The packaging must be vented with a minimum of two (2) NucFil-013 filters. The two (2) remaining filter mounting locations must be plugged. The plugs and filters are installed by first applying thread sealant, and then inserting into the mounting locations and tightening to a final torque of 13.56 ±6.78 N-m (10 ±5 ft-lbs).***

**173.462(d) Identify External Features.**

**(d) The external features of the specimen must be clearly identified so that reference may be made to any part of it.**

This requirement applies to DOT-7A, Type A packagings. Indicate below the type of documentation that shows this requirement is met and where the documentation can be found.

Addressed in:	<input checked="" type="checkbox"/> Drawing	<input type="checkbox"/> Operating Instruction
	<input type="checkbox"/> Specification	<input type="checkbox"/> Manufacturer Supplied Data
	<input type="checkbox"/> Analysis Report	<input type="checkbox"/> Similarity or Documented Record

Specify:

***The DOT-7A Type A testing and evaluation activities for this packaging are recorded under Mound documentation, and under Dockets 89-07-7A, 98-45-7A, and 01-53-7A. Information may be found as provided in Section 4.1, Page A-10.***

***Evaluation of the approved SWB designs under Docket 01-53-7A includes the following:***

- ***Westinghouse Waste Isolation Division Drawing No. 165-F-W1, Revision L and M.***
- ***Westinghouse Waste Isolation Division Drawing No. 165-F-W2, Revision B and C.***
- ***Westinghouse Waste Isolation Division Drawing No. 165-F-W3, Revision B and C.***
- ***Specification E-I-343, Revision 4, "Specification for Fabrication of the Standard Waste Box."***

***The SWB designs documented above meet this requirement.***

## 6.0 MANUFACTURER'S COMMUNICATIONS

### 49 CFR 178.2(c) Notification.

(c) **Notification.** Except as specifically provided in §§178.337-18 and 178.345-10 of this part, the manufacturer or other person certifying compliance with the requirements of this part, and each subsequent distributor of that packaging shall--

- (1) Notify in writing each person to whom that packaging is transferred--
  - (i) Of all requirements in this part not met at the time of transfer, and
  - (ii) Of the type and dimensions of any closures, including gaskets, needed to satisfy performance test requirements.
- (2) Retain copies of each written notification for at least one year from date of issuance; and
- (3) Make copies of all written notifications available for inspection by a representative of the Department.

These requirements apply to DOT-7A, Type A packagings. Indicate below the type of documentation that shows these requirements are met and where the documentation can be found.

Addressed in:	<input type="checkbox"/> Drawing	<input type="checkbox"/> Operating Instruction
	<input type="checkbox"/> Specification	<input type="checkbox"/> Manufacturer Supplied Data
	<input checked="" type="checkbox"/> Analysis Report	<input type="checkbox"/> Similarity or Documented Record

Specify:

*At the time of testing and evaluation, the specific organization taking on the responsibility of manufacturer is unknown. Note that neither the organization that fabricates the packaging nor the organization that tests the packaging is by the DOT definition necessarily the manufacturer. In 49 CFR 178.2(e) the manufacturer is defined by the DOT as follows: "Manufacturer means the person whose name and address or symbol appears as part of the specification markings required by this part or, for a packaging marked with the symbol of an approval agency, the person on whose behalf the approval agency certifies the packaging." The specification marking is defined as, "Specification markings mean the packaging identification markings required by this part (49 CFR 178) including, where applicable, the name and address or symbol of the packaging manufacturer or approval agency." It is assumed in this document that the shipper will assume the responsibility of manufacturer.*

*The Type A packaging evaluated in this document is the result in a sharing of responsibilities. The packaging was designed to meet the Type A packaging requirements when loaded and used as described in this document. The design was developed by the Waste Isolation Pilot Plant (WIPP), Carlsbad, NM. Test units were prepared by a fabricator (unidentified) and tested in the DOE's DOT-7A Type A Packaging Test and Evaluation program by Mound Laboratory to show that when loaded as described they would meet the physical test requirements. Design changes were evaluated in the DOE's DOT-7A Type A Test and Evaluation Program by WHC under Docket 89-07-7A; by WMNW under Docket 98-45-7A; and by DFSNW under Docket 01-53-7A to show that the package designs identified in this document meet the identified requirements. As part of the evaluation process, those requirements not demonstrated as being met are identified as the responsibility of the shipper.*

*This document, in conjunction with the design drawings and packaging specification, identify the requirements for Type A packaging that are met and those requirements that remain to be completed (i.e., identified as shipper is to ensure...). It can therefore serve as a starting point for the notification required by this section. Any organization having packages fabricated should, before using or supplying the packagings to others, prepare a notification that updates the information. The notification should be supplied with the packagings.*

## 7.0 49 CFR 178.3 MARKING OF PACKAGINGS

### 178.3(a) What and How to Mark.

(a) Each packaging represented as manufactured to a DOT specification or a UN Standard must be marked with specification markings conforming to the applicable specification, and with the following:

- (1) In an unobstructed area, with letters, and numerals identifying the standards or specification (e.g., UN 1A1, DOT 4B240ET, etc.).
- (2) Unless otherwise specified in this part, with the name and address or symbol of the packaging manufacturer or, where specifically authorized, the symbol of the approval agency certifying compliance with a UN standard. Symbols, if used, must be registered with the Associate Administrator for Hazardous Materials Safety. Duplicative symbols are not authorized.
- (3) The markings must be stamped, embossed, burned, printed or otherwise marked on the packaging to provide adequate accessibility, permanency, contrast, and legibility so as to be readily apparent and understood.
- (4) Unless otherwise specified, letters and numerals must be at least 12.0 mm (0.47 inches) in height except that for packagings of less than or equal to 30 L (7.9 gallons) capacity for liquids or 30 kg (66 pounds) capacity for solids the height must be at least 6.0 mm (0.2 inches). For packagings having a capacity of 5 L (1 gallon) or 5 kg (11 pounds) or less, letters and numerals must be of an appropriate size.
- (5) For packages with a gross mass of more than 30 kg (66 pounds), the markings or a duplicate thereof must appear on the top or on a side of the packaging.

These requirements apply to DOT-7A, Type A packagings. Indicate below the type of documentation that shows these requirements are met and where the documentation can be found.

Addressed in:	<input type="checkbox"/> Drawing	<input type="checkbox"/> Operating Instruction
	<input type="checkbox"/> Specification	<input type="checkbox"/> Manufacturer Supplied Data
	<input checked="" type="checkbox"/> Analysis Report	<input type="checkbox"/> Similarity or Documented Record
	<input checked="" type="checkbox"/> Packaging	

Specify:

*The user is responsible to ensure proper markings if the SWB is used as a standalone DOT-7A Type A packaging. Note that the organization using the packaging is most likely the manufacturer.*

**178.3(b) Marking.**

(b) A UN standard packaging for which the UN standard is set forth in this part may be marked with the United Nations symbol and other specification markings only if it fully conforms to the requirements of this part. A UN standard packaging for which the UN standard is not set forth in this part may be marked with the United Nations symbol and other specification markings for that standard as provided in the ICAO Technical Instructions or Annex 1 of the IMDG Code subject to the following conditions:

- (1) The U.S. manufacturer must establish that the packaging conforms to the applicable provisions of the ICAO Technical Instructions or Annex 1 of the IMDG Code, respectively.
- (2) If an indication of the name of the manufacturer or other identification of the packaging as specified by the competent authority is required, the name and address or symbol of the manufacturer or the approval agency certifying compliance with the UN standard must be entered. Symbols, if used, must be registered with the Associate Administrator for Hazardous Materials Safety.
- (3) The letters "USA" must be used to indicate the State authorizing the allocation of the specification marks if the packaging is manufactured in the United States.

These requirements apply to DOT-7A, Type A packagings. Indicate below the type of documentation that shows these requirements are met and where the documentation can be found.

Addressed in:	<input type="checkbox"/> Drawing	<input type="checkbox"/> Operating Instruction
	<input type="checkbox"/> Specification	<input type="checkbox"/> Manufacturer Supplied Data
	<input type="checkbox"/> Analysis Report	<input type="checkbox"/> Similarity or Documented Record
	<input type="checkbox"/> Packaging	

Specify:

***This requirement does not apply. The SWB is not being shown to meet a UN Standard.***

**178.3(c) Multiple Markings.**

(c) Where a packaging conforms to more than one UN standard or DOT specification, the packaging may bear more than one marking, provided the packaging meets all the requirements of each standard or specification. Where more than one marking appears on a packaging, each marking must appear in its entirety.

(d) No person may mark or otherwise certify a packaging or container as meeting the requirements of a manufacturing exemption unless the person is the holder of or a party to that exemption, an agent or the holder or a party for the purpose of marking or certification, or a third party tester.

This requirement applies to DOT-7A, Type A packagings that also meet the requirements of a UN standard or another DOT specification. Based on the design of the package, indicate below if the requirement applies or not. If the requirement applies, identify the type of documentation that shows this requirement is met and where the documentation can be found.

This requirement:      ☒ Does not apply.      ☐ Applies; indicate the following.

Addressed in:      ☐ Drawing      ☐ Operating Instruction  
                          ☐ Specification      ☐ Manufacturer Supplied Data  
                          ☐ Analysis Report      ☐ Similarity or Documented Record  
                          ☐ Packaging

Specify:

*The SWB is being tested and evaluated to meet the requirements as a DOT-7A Type A packaging. This requirement applies only to those DOT-7A Type A packagings that also meet the requirements of a UN Standard or another DOT Specification. The user is responsible to ensure this requirement is met, if applicable.*

## 8.0 REFERENCES

49 CFR 173, "Shippers--General Requirements for Shipments and Packagings, *Code of Federal Regulations*, as amended.

49 CFR 178, "Specifications for Packagings," *Code of Federal Regulations*, as amended.

AWS D1.1: 2000, *Structural Welding Code – Steel*, An American National Standard, 17<sup>th</sup> Edition, American Welding Society, Miami, Florida.

DOE/RL-96-57, Volume 1, *Test and Evaluation Document for DOT Specification 7A Type A Packaging*, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE/RL-96-57, Volume 2, *Test and Evaluation Document for DOT Specification 7A Type A Packaging*, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

E-I-343, Revision 4, *Specification for Fabrication of the Standard Waste Box*, Westinghouse Electric Company, Waste Isolation Division, Carlsbad, New Mexico.

Edling, D. A., 1988, *DOT Spec 7A Evaluation document for WIPP Standard Waste Steel Box (SWB)*, August 15, 1988, Mound, Miamisburg, Ohio.

Edling, D. A., 1989, *DOT Spec 7A Evaluation Document for TRUPACT-II Standard Waste Box*, April 19, 1989, EG&G Mound Applied Technologies, Miamisburg, Ohio.

IAEA, 1990, *Regulations for the Safe Transport of Radioactive Material, 1995 Edition*, Safety Series No. 6, as amended 1990, International Atomic Energy Agency, Vienna, Austria.

TS-R-1 (ST-1, Revised), 1996 Edition (Revised), IAEA Safety Standards Series, *Regulations for the Safe Transport of Radioactive Material*, International Atomic Energy Agency, Vienna, Austria.

## DOCKET AND SPONSOR INFORMATION

### DOCKET: 01-53-7A, STANDARD WASTE BOX (SWB)

Applicant:

Signature

Date

Name (print):

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## TEST FACILITY USE ONLY

Document review:

Test Engineer:

Project Engineer:

Packaging drawing

X

X

Operating instruction

X

X

Specification

X

X

PQCL

X

X

Analysis report

X

X

Proof testing (sponsor)

N/A

N/A

**APPENDIX B**  
**SPECIFICATION AND DRAWINGS**



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ECO: 9946

Attachment #1

Page 1 of 18

Specification E-1-343

Revision Number 4

Revision Date 11/14/00

ECO Number 9946

**SPECIFICATION  
FOR FABRICATION OF THE  
STANDARD WASTE BOX**

Prepared by  
Westinghouse Electric Company  
Waste Isolation Division  
Carlsbad, New Mexico

For

U.S. Department of Energy

Cognizant Engineer C.A. Chester *C.A. Chester* 11-13-00  
(Printed) (Signature) Date

Cognizant Manager J.R. Stroble *J.R. Stroble* 11-14-00  
(Printed) (Signature) Date

## SPECIFICATION E-I-343 RECORD OF REVISION

ECO / REV NUMBER DATE	PAGES AFFECTED	REVISION DESCRIPTION
3885 / Rev. 0 11-8-89	All	ECO 3885 created specification.
7886 / Rev. 0 10-12-95	None	ECO 7886 change system from WH01 to PT00.
9029 / Rev. 1 5-27-98	All	ECO 9029 revised paragraph 3.1.2 and updated format.
9309 / Rev. 2 02/10/99	All	ECO 9309 revised the format and included user guidance.
9434 / Rev. 3 06/16/99	All	ECO 9434 incorporated improved guidance for the user of the SWB.
9946 / Rev. 4 <del>10/24/00</del> 11/14/00 11/14/00	All	ECO 9946 updated format.

U. S. DEPARTMENT OF ENERGY  
WASTE ISOLATION PILOT PLANT

SPECIFICATION E-I-343  
STANDARD WASTE BOX

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## 1.0 SCOPE

### 1.1 Purpose

The purpose of this specification is convey fabrication instructions, testing and acceptance criteria for the Standard Waste Box (SWB).

### 1.2 Background

The SWB was developed to package and transport contact-handled transuranic waste to the Waste Isolation Pilot Plant (WIPP) utilizing the TRUPACT-II or HalfPACT (Type B) transport packaging or can be used as a stand-alone DOT 7A, TYPE A packaging. The SWB was qualified by the U.S. Department of Energy (USDOE) in 1988 as meeting the U.S. Department of Transportation (USDOT) requirements for Specification 7A Type A packagings. Qualification has been documented in the USDOE, *DOE/RL-96-57 (Volumes 1 and 2), Test and Evaluation Document for the U.S. Department of Transportation Specification 7A TYPE A Packaging*, under Docket Number 89-07-7A and 98-45-7A.

### 1.3 Definitions

ASNT	American Society for Nondestructive Testing
ASTM	American Society for Testing and Materials
AWS	American Welding Society
CMTR	Certified Material Test Report
SWB	Standard Waste Box
WID	Westinghouse Waste Isolation Division
WIPP	Waste Isolation Pilot Plant
Buyer	The SWB procuring organization
Seller	The SWB fabricating organization
User (Shipper)	The organization presenting the SWB for shipment.
Supplier	The organization providing materials and/or services used in the construction of the SWB.

## 2.0 APPLICABLE DOCUMENTS

### 2.1 USDOT 7A TYPE A Compliance Documents

- 2.1.1 Title 49 of the Code of Federal Regulations, Part 178, Section 178.350 (49 CFR 178.350).
- 2.1.2 DOE/RL-96-57 (Volumes 1 and 2), Test and Evaluation Document for the U.S. Department of Transportation Specification 7A TYPE A Packaging.

## 2.2 WIPP Shipment Compliance Documents

2.2.1 DOE/RL-96-57 (Volumes 1 and 2), Test and Evaluation Document for the U.S. Department of Transportation Specification 7A TYPE A Packaging.

2.2.2 USA/9218/B(U)F, TRUPACT-II Certificate of Compliance for Radioactive Materials Packages.

2.2.3 USA/9279/B(U)F, HalfPACT Certificate of Compliance for Radioactive Materials Packages.

## 2.3 Construction Drawings (Current Revision)

165-F-001-W1, TRUPACT-II Standard Waste Box Assembly

165-F-001-W2, TRUPACT-II Standard Waste Box Assembly Details

165-F-001-W3, TRUPACT-II Standard Waste Box Assembly Details

## 2.4 Codes, Specifications, and Standards

The current edition of codes, specifications, and standards at the time of fabrication shall be utilized.

The codes, specifications and standards referred to by number or title in this specification or on the Contract Drawings shall form a part of this specification:

ASNT	Recommended Practice No. SNT-TC-1A
ASTM A-36	Standard Specification for Carbon Structural Steel
ASTM A108	Standard Specification for Steel Bars, Carbon, Cold-Finish, Standard Quality
ASTM A-510	Standard Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel
ASTM A-513	Standard Specification for Electric-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing
ASTM A-569	Standard Specification for Steel, Carbon (0.15 Maximum, Percent), Hot-Rolled Sheet and Strip Commercial Quality
ASTM A-570	Standard Specification for Steel, Sheet and Strip, Carbon, Hot-Rolled, Structural Quality
ASTM A-576	Standard Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality
ASTM A-865	Standard Specification for Threaded Couplings, Steel, Black or Zinc-Coated Welded or Seamless, for use in Steel Pipe Joints
ASTM B-633	Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel

ASTM D-1056	Standard Specification for Flexible Cellular Materials-Sponge or Expanded Rubber
ASTM D-1186	Standard Test Methods for Nondestructive Measurement of Dry Film Thickness of Nonmagnetic Coatings Applied to a Ferrous Base
ASTM D-3359	Standard Test Methods for Measuring Adhesion by Tape Test
ASTM F-835	Standard Specification for Alloy Steel Socket Button and Flat Countersunk Head Cap Screws
AWS D1.1	Structural Welding Code – Steel

### 3.0 DESIGN REQUIREMENTS AND PERFORMANCE CRITERIA

#### 3.1 Description

The SWB is a box that consists of a bottom and a bolted lid closure. Both ends are convex. Two bumpers are welded to the curved ends of the box. The box has a flange and forty-two threaded rivet inserts. The lid has a flange welded around the perimeter. A 1/4-inch thick rubber gasket is used to seal the lid to the box.

The materials and processes utilized for the SWB are typical in the fabrication industry. The only exception is the use of a unique threaded rivet and the specialized tools required for installation. The Seller may produce the threaded rivets or procure them (Part Number S50-3059) and rivet installation tools from RIVNUT® Engineered Products, Inc., Kendallville, Indiana.

#### 3.2 Material Requirements

All materials of construction shall meet the requirements of this specification and those defined in 2.3.

Materials of construction (structural, weld wire, fasteners, etc.) shall be traceable by Heat or Lot number to a completed SWB. Certified Material Test Reports (CMTRs) shall be included in the data package.

All raw material receiving records, inspection record and or traceable documentation shall be kept on file by the manufacturer and shall be available to the Buyer upon request. All such documentation shall also be traceable to a finish unit serial number.

### 3.3 Fabrication Requirements

#### 3.3.1 Assembly

All components shall be assembled, tack-welded in place prior to final welding so that the unit dimensional and geometric properties can be checked and or adjusted if required.

All components shall provide and or accommodate a proper fit-up to facilitate proper weld joint integrity. Gaps at weld joints of more than 1/8-inch shall not be permitted and the use of metal fillers to bridge weld joint gaps shall not be used.

Temporary bracing to hold dimensional and geometric characteristics during the final weld-off process may be used. All weld tacks shall be removed with the bracing.

Manufacturing processes shall be documented and controlled by instructions, procedures, checklists, travelers, or other appropriate means. Completed fabrication travelers shall be included in the data package.

Components shall be worked to allow for proper heat dissipation during the operation so that the material will not become brittle or deform due to overheating.

All sharp edges and corners shall be removed. The finished part dimensions and geometry shall comply with the applicable detail drawings.

#### 3.3.2 Welding

All welds shall be made using a qualified procedure and qualified welding personnel in accordance with AWS D1.1 or ASME Section IX. Welder qualification records and weld procedures (including weld repair) shall be submitted to the Buyer in accordance with Attachment 1.

All welding instructions such as weld placement, size and configuration shall comply with applicable drawings.

All welds shall be visually inspected for acceptance in accordance with AWS D1.1. Visual weld inspectors shall be qualified per AWS D1.1. Welds failing the acceptance criteria shall be repaired in accordance with AWS D1.1.



During final welding, care should be exercised to ensure deformation or distortion of components or subassemblies are held to a minimum, but within drawing tolerances, by the use of proper welding techniques to adequately dissipate excessive heat. Such techniques shall consist of, but shall not be limited to the use of welding fixtures, temporary bracing, skip welding and cool down periods.

### 3.3.3 Serialization

All units shall be serialized by means of a unique 5 digit serial number, stamped in 2 locations per fabrication drawings. All data package records and supporting documentation shall reference each container by serial number.

### 3.3.4 Leak Testing

Before welding on the corner and middle lift clips, and before applying the paint, each SWB lid and body assembly shall be examined by:

- A. Implementing a written leak test procedure in accordance with ASNT Recommended Practice No. SNT-TC-1A. Leak test technicians shall be instructed in the proper application of the test procedure and shall be monitored by the quality assurance function;
- B. Establishing a 1/2 to 1 psig pneumatic pressure differential as measured with a calibrated pressure gauge graduated in not less than 1/10th pound increments;
- C. Utilizing a leak detection solution applied to all external containment welds;
- D. Repairing the weld if a leak is detected in accordance with AWS Specification D1.1 and retested.

**Caution:** The pneumatic pressurization system shall be equipped with a pressure relief device that limits the pressure to a maximum of 3 psig.

**Note:** Welds attaching the corner and middle lift clips to the SWB body are not subject to leak testing. However, should a lift clip weld be identified for repair, and the repair directly compromises a previously tested weld joint, then a leak test will be performed on the area of repair.

3.3.5 Paint Pre-Qualification and Inspection

A. Pre-Qualification of Paint System

- (1) The paint system shall be pre-qualified prior to use. The purpose of the qualification process is to demonstrate the adhesion characteristics of the paint product when applied to a prepared steel substrate surface.

The qualification process shall include:

- (a) Cut 3 sample coupons ( $\approx 1 \text{ ft}^2$ ) representative of the sheet material used in the construction of the SWB;
  - (b) Prepare the surface of the coupons using the surface preparation method proposed for SWB production. The method shall be documented and implemented in the production painting process;
  - (c) Apply the proposed paint system to obtain a minimum of 3 mil (dry film) thickness;
  - (d) After the paint has dried in accordance with the manufacturer's instructions, the paint shall be tested for adhesion performance.
  - (e) The paint system shall obtain a 4B classification or better, when tested in accordance with Method B of ASTM D-3359.
- (2) The Buyer shall ensure the proposed paint system is compatible with the contents to be shipped as required by 2.1.1.
  - (3) When requested by the Buyer, the Seller shall submit the sample coupons to the Buyer for approval.

B. Production Paint Inspection

- (1) Paint thickness on each SWB shall be measured in the location identified in 3.3.5B(2) and shall meet a minimum dry film thickness of 3 mils exterior and 1.5 mils interior. The method of measurement shall be in accordance with ASTM D-1186, Method A or an approved equal.

- (2) Paint adhesion shall be tested on the first production unit of every lot and on every 25<sup>th</sup> unit thereafter. The paint adhesion shall meet the performance standard stated in 3.3.5A1(e) and shall be tested at the following locations:

- 1 each on the top center of the lid;
- 1 each on either flat side of the body;
- 1 each on either round end of the body;

Once the adhesion test is completed, the Seller shall repaint the test-affected areas.

### 3.3.6 Rivet Installation and Inspection

- A. Develop and implement a rivet installation procedure. The procedure shall address, at a minimum, the rivet installation process, installation tool upset adjustment, and daily recording method. The recording should include, as a minimum, the rivet's original length, upset length, calculated differential, and date of verification.

- B. Prior to the daily use of the rivet installation tool, the tool adjustment shall be verified by upsetting a rivet into a test plate to achieve the upset distance specified in 2.3.

**Note:** The test plate shall be equal to the requirements in 2.3 for both thickness and installation hole diameter.

**Note:** If a hand-operated header tool is utilized, the Supplier shall inspect and measure 100% of the installed rivets.

- C. Rivets shall be installed after painting.

## 4.0 USE REQUIREMENTS

This section will detail the User's receipt, pre-use inspection, and operational procedure for the use of a SWB.

### 4.1 Purpose of Use

- 4.1.1 When the SWB is to be used as a stand-alone Type A packaging, the User shall comply with the requirements and limits stated in 2.1.
- 4.1.2 When the SWB is to be transported within the TRUPACT-II or HalfPACT, and received at the WIPP, the User shall comply with the requirements and limits stated in 2.2.

- 4.1.3 When the SWB is to be transported within the TRUPACT-II or HalfPACT, to a destination other than WIPP, the User shall comply with the requirements and limits stated in 2.1.1, 2.2.2, or 2.2.3.

4.2 Receipt and Pre-Use Inspection

- 4.2.1 Ensure each serial numbered SWB is traceable to the Seller's Certificate of Compliance (C of C) required by 5.4.
- 4.2.2 Inspect the SWB for any major damage (significant deformation, punctures, tears, etc.) which would render the SWB unuseable. If significant damage is found, the User shall not present the SWB for shipment.
- 4.2.3 Ensure all assembly components are present: body assembly (1 each), lid assembly (1 each), gasket assembly (four separate pieces), pipe plugs (2 each), and cap screws (42 each) are present.

4.3 Pre-Loading Preparation

4.3.1 Recommended Tools, Supplies, and Spare Parts

A. Tools (Commercially Available)

- 5/16" Long Arm Hex Key
- 9/16" Long Arm Hex Key
- 5/16" Hex Bit Drive Socket
- 9/16" Hex Bit Drive Socket
- 6 or 12 Point Socket (for filter installation)
- Ratchet Drive Wrench
- Calibrated Torque Wrench (60 LB/FT capacity minimum)
- Lineup Bar (bull or drift pin) with approximately a 3/8" rounded point
- Rivet Installation Header Tools (Options): C-722 Wrench Type Header, C-900 Model A Pneumatic-Hydraulic header, or C-362 Pneumatic-Hydraulic Header (Supplier: RIVNUT® Engineered Products, Inc., Kendallville, Indiana).

B. Supplies (Commercially Available)

- Thread Sealant

**Note:** Non-locking liquid anaerobic thread sealant is the preferred product type for sealing the 1/2-13 Socket Flat Head Cap Screws (SFHCS). This product type provides the necessary sealing performance while allowing the SFHCS to be removed if necessary. If

the SFHCSs are not to be removed, then a locking thread sealant is acceptable.

**Note:** For sealing the threads of the filter and pipe plug, a thread sealant tape or compound is recommended. If preferred, a liquid anaerobic thread sealant is acceptable.

**C. Spare Parts (Available from Seller)**

- Cap Screws
- Pipe Plugs
- Rivets (also available from RIVNUT® Engineered Products, Inc., Kendallville, Indiana, Part Number S50-3069)
- Gasket Assemblies
- Touch-Up Paint.

**D. Approved Filters (Supplied by User or Shipper)**

- NFT-013, produced by Nuclear Filter Technology, Inc., Golden, Colorado.

**4.3.2** Remove the SWB's lid screws and lid. Inspect the 42 rivets for damaged threads, loose fit, etc. If any rivet(s) need adjustment or replacement, perform the following steps:

- A. If rivet has minor thread deformation (burrs, cross thread, etc.), the User may correct the thread deformation by running a 1/2" 13 UNC thread tap through the rivet.
- B. If a rivet is loose (rotates), one of the following corrective actions may be performed by the User.
  - (1) Re-upset the rivet utilizing a Rivet Header Tool (4.3.1A) in accordance with the manufacturer's instructions and 2.3.
  - (2) Replace the damaged rivet by grinding off the protruding head and allowing the rivet body to fall into the SWB body tube frame. Utilizing a Rivet Header Tool (4.3.1A) and a spare rivet (4.3.1C), install the rivet in accordance with the manufacturer's instructions and 2.3.

**4.3.3** Install a minimum of two approved filters (4.3.1D) in any of the SWB's four filter mounting locations. The filters shall be installed by first applying thread sealant (4.3.1B) to the filter body pipe threads. Next, insert the filter into the filter mounting locations and tighten to a final torque of 10 ±5 LBS/FT.

**Note:** The rubber gasket supplied with the NFT-013 filter can be removed at the User's option. The SWB relies on the mechanical interface of the pipe threads with thread sealant to generate a leak tight joint.

- 4.3.4 Install the pipe plugs in any remaining open filter mount locations using a thread sealant (4.3.1B) and tightening to a final torque of 10 ±5 LBS/FT.

#### 4.4 Content Loading

- 4.4.1 When the SWB is to be used as a stand-alone Type A packaging, the User shall comply with the requirements and limits stated in 2.1.
- 4.4.2 When the SWB is to be transported within the TRUPACT-II or HalfPACT, and received at the WIPP, the User shall comply with the requirements and limits stated in 2.2.
- 4.4.3 When the SWB is to be transported within the TRUPACT-II or HalfPACT to a destination other than WIPP, the User shall comply with the requirements and limits stated in 2.1.1, 2.2.2, and 2.2.3.

#### 4.5 Closure Procedure

- 4.5.1 Wipe the gasket sealing surface of the body and lid to remove any loose debris.
- 4.5.2 Install the lid gasket (four separate pieces) by removing the protective tape from the pressure-sensitive adhesive back. Place each piece of the gasket assembly (adhesive side down) onto the corresponding body frame location.

**Note:** Ensure the rivet heads are clear and the mitered gasket ends are interlocked.

- 4.5.3 Carefully place the lid into position ensuring the gasket is not damaged and that the lid and body serial numbers are together. A lifting attachment point is located in the center of the lid and will accept a 1/4"-20 UNC lifting eye.

**Caution:** The lid lifting point is for the lid only.

- 4.5.4 All lid screw threads shall be coated with a thread sealant (4.3.1B) prior to installation. During the installation of the lid screws, a lineup bar may be used to pull the lid into position with the body. Be careful not to damage the rivet threads. If the threads are damaged, repair as stated in 4.3.2.

4.5.5 The recommended procedure for installing the lid screws is as follows:

- A. Install the four corner screws.
- B. Install the middle screws of the straight sides.
- C. Install the middle screws of the curve ends.
- D. Install the remaining screws.

4.5.6 In a crisscrossing pattern, apply an initial torque of all screws to 30 LBS/FT (-0, +10).

4.5.7 In a crisscrossing pattern, apply a final torque of all screws to 50 LBS/FT (-0, +10).

## 5.0 QUALITY ASSURANCE REQUIREMENTS

### 5.1 Quality Assurance Program

The following quality elements have been established, as a minimum, to satisfy the requirements of 49 CFR 173.474, Quality Control for Construction of Packaging.

5.1.1 The Seller shall establish a quality assurance/quality control program implementing the following basic requirements:

#### A. Quality Assurance Program

The Seller shall plan, implement, and maintain a documented QAP that, as a minimum, addresses the requirements of this specification.

#### B. Control of Purchased Items and Services

The Seller shall control the procurement of items and services from their Suppliers. As a minimum the Seller shall:

- (1) Prepare procurement documents which flow down the associated requirements of this specification;
- (2) Obtain Certified Material Test Reports (CMTR) for all structural and fastener components;
- (3) Obtain Certificates of Compliance for all components, excluding the caulk and paint, which are commercial products.

**C. Control of Processes**

The Seller shall control the following special processes:

- (1) Manufacturing processes shall be controlled by instructions, procedures, drawings, checklists, travelers, or other appropriate means. These means shall assure that process parameters are controlled and that specified conditions are maintained.

**D. Inspection**

Inspection activities shall be documented and controlled by instructions, procedures, drawings, checklists, travelers, or other appropriate means. Each person who verifies conformance of work activities for purposes of acceptance shall be qualified to perform the assigned inspection task.

**E. Test Control**

Test procedures shall include or reference test objectives and provisions for assuring that prerequisites for the given test have been met. Test results shall be documented and evaluated by a responsible authority to assure that test requirements have been satisfied. Test personnel shall be trained and qualified as required by the test procedure or process.

**F. Control of Measuring and Test Equipment**

Tools, gages, instruments, and other measuring and test equipment used for activities affecting quality shall be controlled and at specified periods calibrated and adjusted to maintain accuracy within necessary limits.

**G. Handling, Storage, and Shipping**

Handling, storage, cleaning, packaging, shipping, and preservation of items shall be controlled to prevent damage or loss and to minimize deterioration.

**H. Control of Nonconforming Items**

Items that do not conform to specified requirements shall be controlled to prevent inadvertent installation or use.



I. Quality Assurance Records

Records that furnish documentary evidence of quality shall be specified, prepared, and maintained.

5.2 Inspection Requirements

All equipment, components, and assemblies shall be thoroughly cleaned and free of all foreign material prior to shipment.

Final inspection and acceptance by the Buyer will be conducted at the Seller's facility prior to shipment.

The Seller shall be responsible for all tests to ensure finished products meet the requirements of this specification. Test results shall be recorded and traceable to the manufacturing travelers used.

Test and inspection activities shall be documented and controlled by instructions, procedures, checklists, travelers, or other appropriate means. Each person who verifies conformance of work activities for purposes of acceptance shall be qualified to perform the assigned task.

5.3 Personnel Qualification

Non-destructive examination personnel shall be certified per the requirements of ASNT Recommended Practice No. SNT-TC-1A. Personnel holding either Level II or Level III certifications shall sign all test reports.

Visual weld inspection personnel shall be qualified per AWS D1.1.

Welding personnel shall be qualified per AWS D1.1 or ASME Section IX for the processes used.

5.4 Documentation Requirements

The Seller shall submit a data package with each completed SWB or for a list of itemized SWBs. At a minimum the data package will include: Certificate of Compliance (C of C), CMTRs, all inspection and test reports, fabrication travelers, and a list of M&TE used.

The Seller's C of C shall be signed by an officer of the Sellers' Organization, certifying the conformance of the supplied items to the requirements of this specification (including contract drawings). The C of C shall be traceable to the serial number of the component(s).

The Seller shall retain the production documentation (i.e., CMTRs, travelers, test/inspection reports, etc.) on each SWB or lot of SWBs for a minimum of 1 year from the date of delivery, unless otherwise directed by the Buyer.

Additional site specific requirements may be specified by the Buyer in the Purchase Order.

#### 6.0 SUBMITTALS

This section describes the documents the Seller shall submit to the Buyer, when the documents shall be submitted, and whether the documents shall be submitted for record or approval.

The Seller shall incorporate changes as required by Buyer comments and resubmit for review.

Upon approval of submitted documents, the Seller shall not modify project specific parts of the documents listed on Attachment A without the approval of the Buyer.

## ATTACHMENT A - Document Submittal Requirements

DOCUMENT SUBMITTAL REQUIREMENTS			
SUBMIT DOCUMENTS PRIOR TO THE POINTS INDICATED BY THE CODE BELOW:			
F - FABRICATION   C - CONSTRUCTION/INSTALLATION T - TESTING        A - FINAL ACCEPTANCE S - SHIPMENT			
Document Requirements	See Paragraph	For Approval	For Record
1. Quality Assurance Program Manual	5.1.1	F	
2. Manufacturing Travelers	5.1.1	F	A
3. Welding Procedure	3.3.2	F	
4. Leak Test Procedure	3.3.4	T	
5. Rivet Installation Procedure	3.3.6	F	
6. Certified Material Test Reports	3.2		A
7. Visual Weld Inspection Procedure	3.3.2	F	
8. Paint Pre-Qualification Report	3.3.5	F	
9. Paint and Inspection Procedure	3.3.5	F	
10. NDE/Inspection Personnel Qualification	5.3	F	
11. Welder Qualification	5.3	F	
12. Serial Number Traceability Process	3.3.3	F	
13. Supplier's Certificate of Compliance	5.4		A
14. Procedure for Record Storage	5.4	F	
15. Inspection/Test Reports	5.4		A
16. Measuring and Test Equipment List w/calibration due dates	5.4		A

LIST OF MATERIAL

QTY	RECD	ITEM	PART NAME/DESCRIPTION	NOTE DRAWING NUMBER OR NO. PART ID. NUMBER	MATERIAL	MATERIAL SPECIFICATION	STD./NUMBER
GR3JR2GR1	NO			165-F-001-W			
-	1	2	CONTAINER ASSEMBLY	12			
-	1	2	BODY ASSEMBLY	12			
-	1	3	LID ASSEMBLY	12			
1	4	4	BODY BOTTOM PANEL			HOT ROLLED SHEET, 10GA.	ASTM A 569 OR ASTM A 570 GRADE 30 MINIMUM
1	5	5	BODY SIDE PANEL			HOT ROLLED SHEET, 10GA.	ASTM A 569 OR ASTM A 570 GRADE 30 MINIMUM
1	6	6	BODY TUBE FRAME			RECTANGULAR TUBE, 1 1/2"x2"x11GA.	ASTM A 513, TYPE 1 OR 2, GRADE 1008 THRU 1020
4	7	7	BODY BUMPER			SQUARE TUBE, 1"x1"x0.063"	ASTM A 513, TYPE 1 OR 2, GRADE 1008 THRU 1020
2	8	8	BODY MIDDLE LIFT CLIP	11		FLAT BAR, 3/8"x1"	ASTM A 36
4	9	9	BODY CORNER LIFT CLIP	11		FLAT BAR, 3/8"x1"	ASTM A 36
4	10	10	PIPE COUPLING, NPT, 3/4"	6		STEEL, WELDED OR SEAMLESS	ASTM A 865, RECESSED TAPER-TAPPED, EXTRA STRONG
42	11	11	RIVET	5.8		STEEL BAR, ROUND # AR	ASTM A 576, GRADE 1008, 1010, 1018, OR 1110
AR	12	12	SEAM SEALER	9		CAULK	COMMERCIAL QUALITY
1	13	13	LID FRAME BAR			FLAT BAR, 1/2"x1 3/4"	ASTM A 36
1	14	14	LID PANEL			HOT ROLLED SHEET, 10GA.	ASTM A 569 OR ASTM A 570 GRADE 30 MINIMUM
1	15	15	LID LIFT NUT	1.9		STEEL BAR, ROUND #1 1/4"	ASTM A 108, GRADE 1018, COLD DRAWN
AR	16	16	PAINT			WHITE	QUALIFIED IN ACCORDANCE WITH NOTE 1
	17	17	GASKET ASSEMBLY	7		CELLULAR RUBBER, 1/2"x1 1/2"	ASTM D 1056, TYPE 2, CLASS A, GRADE 2, SUEFF A.F.
42	18	18	CAP SCREW	8		ALLOY STEEL, 1/2"-13UNC X1 3/4"	ASTM F 835, SOCKET FLAT HEAD COUNTERSUNK (SFHCS)
2	19	19	PIPE PLUG, 3/4"	8		ALLOY STEEL, SOCKET, NPTF OR PTF	COMMERCIAL QUALITY

GENERAL NOTES

- THIS DRAWING SHALL BE UTILIZED IN CONJUNCTION WITH WIPP DOCUMENT: E-1-343, SPECIFICATION FOR THE TRUPACT-II STANDARD WASTE BOX.
- WELDING PERSONNEL SHALL BE QUALIFIED FOR FILLET WELDS  $\leq 1/4"$  AS SPECIFIED BY AWS D1.1. DETAILS OF FILLET WELDS, QUALIFICATION TEST FOR FILLET WELDS AND PLUG WELDS ONLY (OR EQUIVALENT).
- ALL WELDS SHALL BE VISUALLY EXAMINED IN ACCORDANCE WITH AWS D1.1, VISUAL INSPECTION.
- VISUAL WELD INSPECTORS SHALL BE QUALIFIED IN ACCORDANCE WITH AWS D1.1, INSPECTOR QUALIFICATION.
- RIVET (ITEM 11) INSTALLATION UPSET DISTANCE (ORIGINAL LENGTH MINUS COLLAPSED LENGTH) SHALL YIELD A DIFFERENTIAL MEASUREMENT OF  $0.222 \pm 0.015$ . INSTALL AFTER PAINTING IS COMPLETE.
- AFTER WELDING, THE COUPLINGS THREAD PROFILE AND DEPTH SHALL BE RESTORED USING A  $3/4"-14$  NPT TAP.
- THE GASKET SHALL BE PROVIDED WITH PRESSURE-SENSITIVE ADHESIVE (PSA) ON ONE SIDE. ALL GASKET METERS SHALL BE CUT WITH A KNIFE DIE.
- ZINC PLATE IN ACCORDANCE WITH ASTM B 633, SERVICE CONDITION 2, TYPE II.
- APPLY CAULK BETWEEN ALL SKIP WELDS ON THE BODY BUMPER (ITEM 7) SEAMS. THE CAULK CAN BE APPLIED AFTER PAINTING UTILIZING A WHITE 100 % RTV SILICONE CAULK, OR THE CAULK CAN BE APPLIED BEFORE PAINTING USING A PAINTABLE SILICONIZED ACRYLIC CAULK.
- STARTING AT EACH INSIDE CORNER OF THE BODY BOTTOM PANEL (ITEM 4), APPLY THE FILLET WELD CONTINUOUS IN BOTH HORIZONTAL DIRECTIONS FOR A MINIMUM OF 8". APPLY THE 2-B SKIP WELD CONFIGURATION TO THE BALANCE OF THE INSIDE BODY BOTTOM PANEL WELD JOINTS.
- INTERIOR WELDS ON THE BODY MIDDLE LIFT CLIP (ITEM 8) AND ON THE BODY CORNER LIFT CLIP (ITEM 9) ARE OPTIONAL.
- ITEM 2 AND 3 SHALL HAVE 3 MILS (DRY FILM) OF PAINT APPLIED TO ALL EXTERNAL SURFACES AND 1 1/2 MILS (DRY FILM) APPLIED TO ALL INTERNAL SURFACES, EXCEPT FOR THREADS ON ITEM 10.

INFORMATION ONLY

1 CONTAINER ASSEMBLY

INDEX CODE NUMBER			
SYSTEM	WBE	DWG TYPE	CL VENDOR
PT03	165	01300	44 240

REV	1	DATE	10/13/99	BY	W. WHITE
REV	2	DATE	10/13/99	BY	W. WHITE
REV	3	DATE	10/13/99	BY	W. WHITE
REV	4	DATE	10/13/99	BY	W. WHITE
REV	5	DATE	10/13/99	BY	W. WHITE
REV	6	DATE	10/13/99	BY	W. WHITE
REV	7	DATE	10/13/99	BY	W. WHITE
REV	8	DATE	10/13/99	BY	W. WHITE
REV	9	DATE	10/13/99	BY	W. WHITE
REV	10	DATE	10/13/99	BY	W. WHITE
REV	11	DATE	10/13/99	BY	W. WHITE
REV	12	DATE	10/13/99	BY	W. WHITE
REV	13	DATE	10/13/99	BY	W. WHITE
REV	14	DATE	10/13/99	BY	W. WHITE
REV	15	DATE	10/13/99	BY	W. WHITE
REV	16	DATE	10/13/99	BY	W. WHITE
REV	17	DATE	10/13/99	BY	W. WHITE
REV	18	DATE	10/13/99	BY	W. WHITE
REV	19	DATE	10/13/99	BY	W. WHITE
REV	20	DATE	10/13/99	BY	W. WHITE
REV	21	DATE	10/13/99	BY	W. WHITE
REV	22	DATE	10/13/99	BY	W. WHITE
REV	23	DATE	10/13/99	BY	W. WHITE
REV	24	DATE	10/13/99	BY	W. WHITE
REV	25	DATE	10/13/99	BY	W. WHITE
REV	26	DATE	10/13/99	BY	W. WHITE
REV	27	DATE	10/13/99	BY	W. WHITE
REV	28	DATE	10/13/99	BY	W. WHITE
REV	29	DATE	10/13/99	BY	W. WHITE
REV	30	DATE	10/13/99	BY	W. WHITE
REV	31	DATE	10/13/99	BY	W. WHITE
REV	32	DATE	10/13/99	BY	W. WHITE
REV	33	DATE	10/13/99	BY	W. WHITE
REV	34	DATE	10/13/99	BY	W. WHITE
REV	35	DATE	10/13/99	BY	W. WHITE
REV	36	DATE	10/13/99	BY	W. WHITE
REV	37	DATE	10/13/99	BY	W. WHITE
REV	38	DATE	10/13/99	BY	W. WHITE
REV	39	DATE	10/13/99	BY	W. WHITE
REV	40	DATE	10/13/99	BY	W. WHITE
REV	41	DATE	10/13/99	BY	W. WHITE
REV	42	DATE	10/13/99	BY	W. WHITE
REV	43	DATE	10/13/99	BY	W. WHITE
REV	44	DATE	10/13/99	BY	W. WHITE
REV	45	DATE	10/13/99	BY	W. WHITE
REV	46	DATE	10/13/99	BY	W. WHITE
REV	47	DATE	10/13/99	BY	W. WHITE
REV	48	DATE	10/13/99	BY	W. WHITE
REV	49	DATE	10/13/99	BY	W. WHITE
REV	50	DATE	10/13/99	BY	W. WHITE
REV	51	DATE	10/13/99	BY	W. WHITE
REV	52	DATE	10/13/99	BY	W. WHITE
REV	53	DATE	10/13/99	BY	W. WHITE
REV	54	DATE	10/13/99	BY	W. WHITE
REV	55	DATE	10/13/99	BY	W. WHITE
REV	56	DATE	10/13/99	BY	W. WHITE
REV	57	DATE	10/13/99	BY	W. WHITE
REV	58	DATE	10/13/99	BY	W. WHITE
REV	59	DATE	10/13/99	BY	W. WHITE
REV	60	DATE	10/13/99	BY	W. WHITE
REV	61	DATE	10/13/99	BY	W. WHITE
REV	62	DATE	10/13/99	BY	W. WHITE
REV	63	DATE	10/13/99	BY	W. WHITE
REV	64	DATE	10/13/99	BY	W. WHITE
REV	65	DATE	10/13/99	BY	W. WHITE
REV	66	DATE	10/13/99	BY	W. WHITE
REV	67	DATE	10/13/99	BY	W. WHITE
REV	68	DATE	10/13/99	BY	W. WHITE
REV	69	DATE	10/13/99	BY	W. WHITE
REV	70	DATE	10/13/99	BY	W. WHITE
REV	71	DATE	10/13/99	BY	W. WHITE
REV	72	DATE	10/13/99	BY	W. WHITE
REV	73	DATE	10/13/99	BY	W. WHITE
REV	74	DATE	10/13/99	BY	W. WHITE
REV	75	DATE	10/13/99	BY	W. WHITE
REV	76	DATE	10/13/99	BY	W. WHITE
REV	77	DATE	10/13/99	BY	W. WHITE
REV	78	DATE	10/13/99	BY	W. WHITE
REV	79	DATE	10/13/99	BY	W. WHITE
REV	80	DATE	10/13/99	BY	W. WHITE
REV	81	DATE	10/13/99	BY	W. WHITE
REV	82	DATE	10/13/99	BY	W. WHITE
REV	83	DATE	10/13/99	BY	W. WHITE
REV	84	DATE	10/13/99	BY	W. WHITE
REV	85	DATE	10/13/99	BY	W. WHITE
REV	86	DATE	10/13/99	BY	W. WHITE
REV	87	DATE	10/13/99	BY	W. WHITE
REV	88	DATE	10/13/99	BY	W. WHITE
REV	89	DATE	10/13/99	BY	W. WHITE
REV	90	DATE	10/13/99	BY	W. WHITE
REV	91	DATE	10/13/99	BY	W. WHITE
REV	92	DATE	10/13/99	BY	W. WHITE
REV	93	DATE	10/13/99	BY	W. WHITE
REV	94	DATE	10/13/99	BY	W. WHITE
REV	95	DATE	10/13/99	BY	W. WHITE
REV	96	DATE	10/13/99	BY	W. WHITE
REV	97	DATE	10/13/99	BY	W. WHITE
REV	98	DATE	10/13/99	BY	W. WHITE
REV	99	DATE	10/13/99	BY	W. WHITE
REV	100	DATE	10/13/99	BY	W. WHITE

THIS DRAWING TAKEN FROM: N/A

B-19/20



